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VOL. CXXIV., No. 2630.] TUESDAY, OCTOBER 7, 1913. [65TH YEAR.

EDITORIAL NOTES.

The Inauguration of the Exhibition.

WITH ceremony consistent with its importance, the National Gas Exhibition was opened by the Right Hon. the Lord Mayor of London (Sir David Burnett, Bart.) last Wednesday. In the main, the exhibition was then completed; but there were visible signs that there was still perfecting work to be done which, from its very nature, would require two or three more days. Sympathy and not censure for this is the due of the Executive Committee. In these days, one cannot adequately or exactly estimate the time-margin that should be allowed, in carrying through a large scheme of this kind, for dealing with the highly refined susceptibilities of members of trade unions employed by building contractors, as well as for covering the waste of time occasioned by the delinquencies of railway companies in the matter of the transmission of goods, and for unravelling the puzzle created by some manufacturers of appliances by their inattention to instructions as to the forwarding of goods. The organizers had all these drawbacks to contend with; and, under the circumstances, they did remarkably well by Wednesday morning. To-day the whole scheme looks innocent of the slightest trouble or hitch having ever been behind it.

The verdict is that it is an excellent display; and its original character has struck all who have seen it. It impressed the Lord Mayor of London, the Lord Provosts of Edinburgh and Glasgow, the Lord Mayor of Cardiff, the Mayors of Metropolitan and Provincial boroughs, as well as other guests on the day of its inauguration, which was so much dignified by the gracefulness of the function. The series of object-lessons, the kaleidoscopic character of the scenes, and the whole symmetry of the scheme, impressed them with the fact that there was something here altogether different from anything they had previously seen in the way of exhibitions. It was admittedly a revelation to the visitors as to what was possible in the way of interesting and educating the public by departure from antecedent and no longer attractive means of tempting popular interest. At both the opening of the exhibition and at the luncheon, the President of the Exhibition (Sir Corbet Woodall, D.Sc.), made perfectly manifest the pride he felt at the united front shown by all sections of the gas industry in this co-operative enterprise, in which individuality is altogether submerged, and unity rises supreme. It is well in memory how a year ago, at the first annual conference of the British Commercial Gas Association, Sir Corbet in his Presidential Address spoke of the new life and zeal existing in the gas industry; and of what he then spoke is well exemplified in this exhibition. The first result of this that was apparent to the civic and other visitors on Wednesday was the entire absence of all that savoured in any way of exhibition of goods for the sake of immediate trade in the goods themselves. The complete absence, too, of representatives of manufacturers, pressing to advance their employers' interests by the praise of their individual goods, which praise is promptly discounted by the fresh praise poured into the ears of the visitor by the gentleman in charge of the next competing stand, was particularly observed; and the visitors were pleased to learn of the disinterested standing of the attendants, coming as they do from the show-rooms of several gas undertakings, and having no particular predilection for any firm's goods.

At the opening, too, there were other things that caused some amazement, and which go to show how little the world knows of the affairs of the gas industry and of the ubiquitous part that it has in everyday life. Sir Corbet quoted figures as to the capital of the gas-supply industry, and as to the employment given by the industry. The figures were more indicative of magnitude than comprehensive of all that the industry means in one or other respect; but the data gave the Lord Mayor of London cause for astonishment. Not even a Lord Mayor can be expected to know all about such matters; but if the Lord Mayor is amazed by such information as Sir Corbet gave, then what about other people? The mere confession of surprise from such a quarter shows the necessity for illustrating to the world the vast scope of the trading activities of the industry, and what it can do towards subscribing to the greater economy and the better health of the people. The manner in which the boundaries of the industry in the matter of the applications of its primary product have been, now for some years, consistently spreading outwards also impressed the civic dignitaries and other guests present on the opening day. The strides made in respect of the efficient use of gas for light, heat, and power have, indeed, put into the very body of the industry such potency that there is nothing immediately present or upon the horizon of affairs that can stay its progress in all the directions of utility.

So much is this the case, that the most serious and philosophic of thinkers are of opinion that the industry is only at the beginning of a fuller life in the service of mankind. Convinced of this to such an extent is the Lord Provost of Edinburgh that he regards the present as the beginning of the "gas age." If he is right, and if we are to count what the gas industry has accomplished as but insignificant in comparison with what is to come, then we give up all attempt at trying to frame in our minds what the future of the industry is likely to be in respect of magnitude. We believe, however, the Lord Provost is right, and that the economy of the industry in respect of its utilization of coal—its utilization without, practically speaking, any waste—will cause its staple product to enter more and more into the daily lives and work of the people. To that end, as Mr. Edward Allen said, the exhibition has been conceived and materialized; to that end, said Professor Harold B. Dixon, has the industry linked itself closer with science with already beneficent results, as is witnessed by the appliances that are growing daily and daily in popularity. The municipal representatives saw, and saw clearly, from the exhibition the large influence that the gas industry can bring to bear upon their own work in improving the conditions of the people, and that, properly managed and properly treated, it offers a short cut to the attainment of a still closer approach to the height of the topmost pinnacle in the ideals of civic administration—the better health of the people. Ameliorate the circumstances of the masses—give them cheap light, proper and cleanly cooking arrangements, convenient methods of heating, and a purer atmosphere, and the result will be of untold value to the whole of our urban communities.

There was one thing bearing upon this point that was striking in one of the speeches of the President on Wednesday. He said that the exhibition was not an *anti*-electric, but a *pro*-gas exhibition. Some of our friends in the electrical industry realize this; some do not. Those who do not are doing their best to disclose the smallness and paltriness of their minds, and are making themselves the objects of ridicule in the eyes of those who are capable of taking a more dignified attitude. There is no doubt the exhibition will be a revelation to many among those in the competing industry, who have gone about blind to any progress but that which has an electrical label affixed to it. If, in the event, it had no other effect than this, then it would be something to the good, for we should then read and hear less nonsense from sources where, it might be expected, greater and more exact knowledge existed.

However, the exhibition is finished. It is a temporary but imposing monument to its originators and organizers. The more lasting monument will be in the good that the exhibition will do. To make this good as extensive as possible is the work that lies in the hands of every individual whatever the capacity he holds in the administrative and executive affairs of the industry. Let this work not be neglected.

The Warning, and the Road to Salvation.

We are not quite clear in our minds whether we ought to be amused or amazed, or to treat seriously the lecture that Mr. F. D. Marshall delivered at the Manchester University on Saturday, before the Manchester and District Junior Gas Association. There was something that reminded of Dr. Jekyll in the attitude taken up by the lecturer. He was there as a gas engineer, speaking to gas engineers. He protested that he was not there to preach revolutionary doctrines with the idea of inducing his hearers to forsake ploughing their very profitable furrow to turn fresh soil in another field of enterprise. But, having said this, he later proceeded to advocate, as though it was nothing of the kind, a policy of the most revolutionary character. He adopted the *rôle* of a seer, and though he could only see through the glass darkly, and his vision was somewhat obscure, he used all that he imperfectly saw and the indefinite vision upon which to base a definite and somewhat assertively presented scheme. But the worst part of all in his lecture was the doleful view he took of the position of the gas industry compared with that of the electricity industry; and with this view he hopes to convince the gas industry that its only chance of salvation is to adopt the plan that he offers for its acceptance. But if the gas industry does not happen to see things in exactly the same light that he does, well, then he must pardon it, and allow it to pursue its profitable career until, by the aid of his glass, he can see things more clearly, and then submit for consideration something that has better definition than that which is now before us.

We have never been able to see that the greatest good, and the truest conversions, are effected by preaching of the horrors of the infernal regions. Mr. Marshall, with the responsibilities of official life long since shifted from his shoulders, and now in the position of a free-lance, sees the handwriting on the wall for the gas industry—that is to say, if it does not betimes turn from the errors of its obstinate ways. To him it is plain that electricity is making vast inroads on the gas preserves; electricity is realizing phenomenal progress; where gas engineering has marched a yard, electrical science has marched a mile; and the gas industry is fighting against terrible odds, and will soon be driven over the glacis to its last stronghold—gas heating. We strongly advise our friend to seek an antidote to the complaint from which he is suffering in the Board of Trade returns, where he will find information as to a duplication of the business of the gas industry during the days of the progress of the electricity industry, and to take a period of rest at the National Gas Exhibition, where the surroundings will assure him that the gas industry is not standing still while the electricity industry is moving. There, too, he will find reasons for regret that he was not more intimately acquainted with the current doings of the gas industry, so as to have saved him from penning the veiled charge of somnolence contained in the words: "Unless we meet the "enemy by concerted and rational measures, we must even- "tually succumb." "Concerted and rational measures" are precisely what the gas industry has adopted, not because of any fear of extinction, but in order to keep the ball of progress rolling, and to develop those lines of business that promise very lucrative employment for the capital and energies of the industry.

The vision of our friend is not only obscured as to what are the relative positions of the gas industry and the electrical industry, but it is also very much obscured as to what the gas industry is doing. Both industries are at the present time pursuing their respective courses on their merits, and both are progressing. The real cause of the obscuration of the vision of our monitor is low-temperature carbonization. He is enthusiastic over it; it would not be Mr. Marshall if he were not enthusiastic over anything to which he seriously applied his hand. But his enthusiasm has carried him to the point at which he regards low-temperature carbonization as "our only resource." We, and the technical men of the industry, are far from thinking that this is the case, though we are not so obstructive or dense in imagination, or arbitrary in conclusion, as to think that the time may not arrive when there may be a possibility of a low-temperature process becoming a useful ancillary in the industry's work. But that time is not yet. The low-temperature carbonization process which is under the wing of Mr. Marshall is that of the Tarless Fuel Syndicate. This process we have described in our columns, and have pronounced features in it as novel among low-temperature systems, and the completeness with which it has been brought to the present stage as highly creditable to those who have had its technical development in hand. Upon the revelations of succeeding balance-sheets of the Syndicate, we shall be able to judge whether parental confidence is likely to be so completely fulfilled as is suggested by estimates based on carefully conducted small-scale operations and more or less abstract argument. The gas industry has its eye on this business; and it will not fail to keep itself primed, and to weigh with care, in the light of its own affairs, all that is presented in relation to it.

The main thing, however, at the moment is that the Tarless Fuel Syndicate's process, in Mr. Marshall's view (framed on the pessimistic notion that the gas industry, with its ever-widening borders, must eventually succumb if it does not do something to avert disaster), offers an excellent means for fulfilling the scheme of salvation that he prescribes. Briefly put, the scheme is this: Believing that everything points to the prime mover in electricity generating stations in future being the gas-engine, Mr. Marshall suggests that the business of the gas industry is to adopt a low-temperature carbonization system, and use part of the resultant solid fuel in gas-generators, and supply power gas to electricity stations, or even electricity in bulk at the switchboard at 0·1d. per unit, in order that electricity undertakings may wipe out all the gas industry's lighting business, and perhaps much else, at ½d. per unit. The gas industry is apparently to make a living by doing a lucrative business in smokeless fuel, and in the bye-product tars and oils, and everything that therein is. We see obstacles to the consummation of this pretty picture, which contemplates, as a first step to fulfilment, the suicide of the gas industry in respect of at any rate its lighting business. "I am not here to preach revolutionary doctrines "with the idea of inducing you to forsake ploughing your "very profitable furrow to turn fresh soil in another field of "enterprise." Of course not. If, however, Mr. Marshall's scheme is not revolutionary, we wonder what a scheme would look like upon which he would confer that description. It would assuredly be something truly marvellous. An unfortunate thing for the scheme is that there must be two parties to a contract; and the gas industry is not at all sure that the electrical industry would be disposed to accept its kind offices in the manner suggested by our present adviser. If it did not, then, we take it, it is his view that the industry must eventually succumb. It is more probable that, instead of the electrical industry being so amiably disposed towards the gas industry as to desire to place business in its hands in order to keep it alive, it would infinitely prefer to get it out of the way, by adopting Mr. Marshall's scheme (if they see anything good in it) lock, stock, and barrel.

Is there no alternative to the dismal prospect for the gas industry, as seen by our friend, in the event of the electrical industry not being inclined to succour the gas industry? He does not look upon any scheme for the production of electricity by the aid of town gas as a commercial proposition. Since Mr. Marshall resigned his official connection with the gas industry, there has been much progress in it—not (of course, we do not mean) as a consequence of his resignation, but because the technical men who remain in the industry have not been asleep. There are now engineers who are talking of putting gas into the holders at a net price of 4d. per 1000 cubic feet, and one engineer at least is contemplating putting gas into his holders without any production charge being left against it. There are electrical engineers who are considering the present and prospective altered positions in the gas industry, and their bearing on their own industry. There are some of them who see that, when an illuminating power standard for gas is no more, and when calorific value alone obtains, with the improvements in gas manufacture, and with the enhanced value of residuals, there will be a chance of tapping the town-gas mains for power purposes at a price that will pay them for gas of the quality that can be offered, less of which will be required than of producer gas to realize a certain thermal value in the cylinders of their engines. We are not at all despondent of town gas not only maintaining the volume, but increasing the volume, of its business; we are not at all sure the gas industry will not, without adopting any revolutionary scheme, be occupying in time the very field that Mr. Marshall, taking another road, maps out for it. But at the present there is a darkness in the glass into which we are peering, and the vision is obscured. Therefore we will not now dream dreams, nor will we conjure up visions. But the industry will watch and work, and seek to be prepared to occupy fresh fields as opportunity offers.

Among the fields which will not escape survey will be low-temperature carbonization, and its potentialities whatever their character will be, as the prospect unfolds itself, duly and fully weighed.

The picture in the lecture before us, blurred as are its main features, is useful in the assistance it renders in keeping all aspects of the situation, present and prospective, before us; and if we file the lecture away among things that are preserved for future reference, Mr. Marshall will know it is not because we undervalue his scheme as a suggestion when it is detached from the pessimistic views that he chose to put forward as an excuse for presenting it. At the present time, the gas industry is serving the community well by working to put into its possession as many B.Th.U's. as it possibly can for a given price; and this seems (for this country, at any rate) to be a good business objective, with a greater certainty to support it than anything Mr. Marshall suggests in his lecture. In following the straight road to this objective, the gas industry may peradventure pick up *en route* a considerable part of the power requirements of the electrical industry, or, at any rate, that part of those requirements which is a distance from the waste gases of blast-furnaces and of coke-ovens.

The Presidency of the British Commercial Gas Association.

An announcement was made at the meeting of the Southern District Association at the National Gas Exhibition last Friday to which we attach the highest importance in relation to the future of the British Commercial Gas Association, and of combined work in furthering the business interests of the gas industry. According to the rules of the Association, the President for the time being of the Institution of Gas Engineers is also to be President of the Association. So long as this rule continued, the Commercial Association could never have as its supreme head any but a technically trained gas man, and in most cases men—this is not written in any sense in a disparaging spirit, but only to give point to the position—holding only official positions; whereas money subscribed for prosecuting the operations of the Association is voted by those (together with the firms constituting the Society of British Gas Industries) controlling the administrative work of gas undertakings. Moreover, it might happen that the President of the Institution was engineer to some non-subscribing concern. Such anomalous conditions could not long be defended; and there was in them a source of weakness in regard to the future of the Commercial Association. The President of the Institution (Mr. Edward Allen) saw this, and he also felt that, if Chairmen of Boards of Directors and of Corporation Gas Committees had the honour of the presidency of the Association conferred upon them, as is their right, the Association would be substantially strengthened by the new interest and ties that would thus be permanently established. The outcome of the movement by Mr. Allen is that the Committee of the Association have agreed to introduce a resolution, at the meeting of the members of the Association in a fortnight's time, which will bring about this very desirable change; and the first nominee for the presidency under the new order of things will be Bailie T. Paxton, the Convener of the Glasgow Gas Committee, whose interest and belief in the work of the Association have been, from the inception of the organization, firm and at a high level.

We are glad to see the change, because we are fully convinced that it is correct in the interests of the industry as a whole. In days gone by—when there were critics who lamented the degenerate results of organized work (such as it was) in the industry, when there were constant references to the incapacity of the Institution for doing this and that through the impecunious condition of its purse, and when the trials that were encountered in getting money for any purpose in the industry were heart-breaking—there was strong advocacy in the "Journal" for the broadening of the basis of the central organization by getting into its ranks, for the general good of the industry, and for giving a central organization greater scope for work, those who were administratively at the head of our gas undertakings. We are quite sure that this was right. The British Commercial Gas Association is in effect an alternative to the suggestion. What it has done since its advent is the confirmation; and this new move for bringing out the administrative heads of our undertakings to take the leadership in the work that has the most beneficial effects on the common interests of the industry simply shows that our original argument is finding its way into more general favour and acceptance. We felt sure that the change must come; and that those who desired to maintain the supremacy of the Institution in all matters, and to refuse to those who have the largest financial interest in the affairs of the industry place and voice in its organized work, would have to give way before the developments of the times, and the pressure of these developments. We are certain that it is the correct thing to place in the presidential chair of the Association those of influence, position, and worth in the administration of the gas undertakings of the country. It is the way to help forward both the work of the entire industry, and that of individual undertakings. Ask Bailie Paxton of Glasgow, or Mr. Councillor Kay of Manchester, or any of the non-technical but business men at the heads of gas companies who are identified with the work of the Association, whether they do not feel themselves better equipped and more competent than ever for administrative service to the gas concerns they assist in directing solely through their connection with, and interest in, the work of the Commercial Gas Association. We are confident of the answer.

An Outside Technical Observer.

The North of England Gas Managers' Association have more than once set an example that might with advantage be emulated by other professional organizations in the gas industry, if their rules do not prohibit them from taking a like step, and, if they do, then a little relaxation of the rules might be desirable. The Association once had an excellent President (the late Sir Samuel Sadler) who was identified with the chemical industry, and who was allied to the gas industry through its bye-products. They have also had a President who is not strictly speaking a gas manager, and who has no pretensions to being a gas engineer, but whose interests are largely concentrated in the secretarial and commercial departments. This year they have, in the person of Mr. Ernest F. Hooper, a President whose technical interests are bound up with the coke-oven bye-product industry, with which the gas industry has so much in common through its secondary products, and from the nature of its technical work. In these columns, there always has been advocacy of the admission into our organizations of those who are technically concerned in the coke-oven industry, because not only is it a fact that there is a disposition, in industrial areas where metallurgical coke is needed, to partially adopt coke-oven practices in gas-works, but in most other respects interchange of experiences would be beneficial regarding both carbonization procedure and the dealing with the liquid residuals, to say nothing of the contemplation of the prospect of gas-works becoming large customers for the gas produced by coke-ovens. We are afraid there is not sufficient regard paid to these matters from the prospective point of view in the gas industry, but that the old self-concentration generally persists. This is right up to a point; but a wider range of consideration is more in harmony with the times, and with the developments that are proceeding external to the industry, but the influences of which overflow into, and mingle with, its affairs.

In his Presidential Address last Saturday, Mr. Hooper hinted that, without adopting any presumptuous attitude, he was, as an outside observer, adopting the *rôle* of a candid friend of the industry. But after carefully reading the address, we fail to find that the amiable critic had much to criticize, but that he did distinctly show that, in present circumstances, the gas industry was pursuing a most economical course in its operations, and in all respects is on the right road, other than in its indifference to considering its own developments conjointly with those of allied industries. The gas industry, more than ever to-day, believes in the value of many brains, and cultured brains, in the consideration of its technological problems; and it believes, without assailing individualism, in the concentration of effort. There is no fault to be found with it there. The industry has also considerably broadened the opportunities for giving the aspirants to technical position in its most important official spheres a good scientific training. There is no fault to be found with it in this respect. Day by day, its men are working to discover where there can be greater economy and efficiency, believing that it is from them that further developments will spring in the future—developments both technical and commercial. Because there are some works under management that lag in the rear in improvement, it cannot be laid to the charge of

the gas industry as a whole that it is behind the day in its technical or commercial work. It is quite convinced, too, that it is working, slowly it may be, but surely, towards the end of providing still cheaper gas (if the coal market will allow it to go forward without a permanent check), and to encourage the use of gas-fires, so helping to the conservation of the nation's resources by stemming the "ignorant prodi-"gality" that results in the barbarous destruction of constituents of coal of which the world has need. The gas industry uses its raw material in a most economic way, by removing from it all that is valuable. But it is clear that Mr. Hooper is of opinion that a closer investigation should be made to ascertain whether or not present processes secure the maximum economy, or profit, per ton of coal carbonized, and whether, looking beyond our own current doings, there are not openings for fresh enterprise.

The attitude of our friend in this regard is suggestive, and not advisory or dogmatic; and his reasons are clear, if not altogether novel. The more gas is used, the greater must be the production of coke, when we have arrived at maximum gas yields; the demand for coke fluctuates; the oil market tends to maintain an oppressive position; there is a growing demand for a home-produced motor spirit. These are facts that should be, it is thought by outside observers, conducive to the consideration, with a little more seriousness, of low-temperature carbonization. But while the time is ripe for deliberation over the position as it is to be seen to-day, it does not by any means follow that the time is ripe for the adoption of revolutionary practices on the part of the gas industry. Mr. Hooper does not say that it is. But there seems to us to be a wealth of meaning in his words when he accuses—and this is perhaps the most open criticism that he makes—the gas industry of giving maximum attention to gas production, while giving the minimum attention to the bye-products. With all humility, we confess that in the case of some gas undertakings, the criticism is justified by the facts; but the "some" does not necessarily represent the majority.

After all, however, where do we arrive, taking alone the constructed case of Mr. Hooper? We find few cases where the industry is astray, in the present circumstances. It is true that many gas-works are realizing from the coal they carbonize only a poor quantity of sulphate of ammonia. But this cannot be accounted a condemnation of all gas-works managements. We agree, too, that it will be a distinct step forward when we reach a dependable liquid process of purification with cyclic action. But on the ground of cost alone—including the cost of labour in emptying and refilling purifiers and in revivification—the present method of purification cannot be condemned. Purification is now conducted at a fraction of a penny per 1000 cubic feet of gas sold; so that we are afraid, while a successful liquid process would certainly be adopted on its merits, it would only gain headway as and when purification extensions were demanded. Moreover, if some of the processes are found to be workable that are tentatively proposed, whereby the manufacture of sulphuric acid could be conducted profitably on a large number of gas-works which do not at the present time themselves treat their spent oxide, then there would be less disposition still to alter the conventional order of things. Still, if one becomes wholly practicable, a liquid process of purification is the ideal. On the whole, therefore, there does not appear to be very much for a candid, or any other critic, to, speaking generally, criticize in connection with the gas industry, except perhaps the one point as to the desirability of a wider consideration being given to what is being done in allied industries, and to whither new demands are leading the industry or are inviting it to go.

What of industrial prospects? Our "candid friend" regards them as good; and he is in harmony with those who keep an eye on the tendencies of our particular industrial evolution. The domestic and the industrial heating fields are offering great scope for development—not only for the heating of rooms on the one hand, and of metals on the other, but for hot-water supply. Again the markets for sulphate of ammonia at home have not been developed to the full, which supplies an argument for the persistent pursuit of the excellent work that the Sulphate of Ammonia Committee have in hand in trying to convert the farmer to more productive ways. Furthermore the demand for creosote is not being fully satisfied; and pitch is at a relatively abnormal figure in relation to former normal years. There are cries for benzol; but the washing of gas does not, at the moment, inspected from all sides, look like a profitable proposition. Experiments are going forward in the use of coal gas under high-pressure in cylinders as a motor fuel. The further enhancement of the value of tar appears probable in view of the wider demand for it, and the new products that are to be realized from it. These considerations, combined with careful scientific investigation, give a large amount of confidence in the gas industry, in which confidence the President, from his outside scrutiny, shares.

There is a separate feature in the address, to which the attention of Mr. H. E. Jones may be specially directed. The revival by Mr. Jones of the suggestion that gas undertakings should become possessed of coal-yielding territory of their own does not appear to Mr. Hooper to hold in it anything very promising. He gives reasons for his opinion. Perhaps Mr. Jones can throw weight on to the side of the colliery-owning project which will modify the impression that what Mr. Hooper says upon this matter is in the main right.

PERSONAL.

In the "JOURNAL" for the 9th ult. (p. 721), it was announced that Mr. W. H. JOHNS would be the lecturer on Gas Engineering and Supply for the current session at the Smethwick Municipal Technical School. As Mr. Johns will shortly be taking up the duties of his new appointment at Malvern, Mr. H. E. Stone, of Nechells, Birmingham, the Hon. Treasurer of the Midland Junior Gas Association, will deliver the lectures.

"Many happy returns of the day" to Mr. THOMAS NEWBIGGING. The day before the opening of the National Gas Exhibition was the eightieth birthday of our friend; and the congratulations of the whole of the professional element of the gas industry go to him. His has been a life spent in the service of the industry; and, faithful to that service, on the morning of the opening of the exhibition a column article appeared in the "Daily Chronicle" from his pen, on "The Gas Industry: Its Vitality and Progress." The article not only showed the vitality of the industry, but that of the veteran worker and writer. An abstract of the article appears on another page.

Scottish Junior Gas Association.—Arrangements for the Session 1913-14.

We have received from the Hon. Secretary of the Western District Division of the Scottish Junior Gas Association (Mr. David Fulton, of Helensburgh) the syllabus for the tenth session, which opened last Saturday under the presidency of Mr. John Wilson, of Falkirk, whose address will be found elsewhere. During the session the following papers will be submitted: Nov. 1, "The Commercial and Distribution Side of a Gas Undertaking," by Mr. J. B. Stewart, of Glasgow; Dec. 13, "Complaints and their Treatment, and Some Notes on Underground Work," by Mr. Alex. Paterson, of Glasgow; Feb. 7, 1914, "An Experience in Distribution," by Mr. W. Wilson, of Falkirk, and "The Heating of Retort-Settings," by Mr. D. T. Marwick, of Temple; and March 7, "Some Notes on Repairs to Gas-Works Plant," by Mr. T. G. Moffat, of Tradeston. There will be two lectures during the session—one on Nov. 29, by Mr. J. Lord, on "Gas-Furnaces," and the other on April 11, 1914, by Dr. W. B. Davidson. Visits will be paid to the National Gas Exhibition (with other Junior Associations), the Cambuslang Gas-Works, the Glasgow Corporation Gas Department Workshops, the Granton Gas-Works, and (with the Eastern District members) to the Uphall Oil-Works. The annual meeting and dinner will be held on the date of Dr. Davidson's lecture. The Hon. Secretary of the Eastern District Division (Mr. Lawrence Farquhar, of Alloa) has sent the programme for the next session, which will open on Saturday, in the Heriot-Watt College, Edinburgh, under the presidency of Mr. W. Geddes, of Granton. The business will comprise the delivery of the President's Inaugural Address, and a lecture on "Safety Gas-Meters" by Mr. Thomas Fox, of Messrs. James Milne and Son, Limited. The quarterly meetings will be held at Perth and Dunfermline on the 22nd prox., and Feb. 7; and the annual general meeting will take place on the 11th of April. Visits will be paid to the following works: The Coltness Iron Company, Limited, Blairhall Colliery, East Grange, on the 25th inst.; Messrs. R. & A. Main, Limited, Falkirk, on Dec. 13; Messrs. J. G. Stein and Co., Limited, Bonnybridge, on Jan. 17; James Ross and Co., Limited, Falkirk; and (jointly with the Western District Association) Young's Paraffin Light and Mineral Oil Company, Limited, Uphall, on March 21.

Among the gentlemen who have been proposed to fill the office of Mayor for the ensuing municipal year, we are pleased to notice Mr. A. E. Brotherton, head of the firm of Messrs. Brotherton and Co., ammonia and tar distillers, who has been asked by both the Unionist and Liberal members of the Leeds City Council to accept the office of Lord Mayor.

THE NATIONAL GAS EXHIBITION.

INTERNATIONAL EXHIBITIONS HALLS, SHEPHERD'S BUSH.

[Entrance in Uxbridge Road.]

OCTOBER 1 TO NOVEMBER 1.

Organized by the Leading Gas Companies and Corporation Gas Committees of the United Kingdom and the Society of British Gas Industries.

President - SIR CORBET WOODALL, D.Sc., M.Inst.C.E.

A NIGHT VIEW OF THE MAIN ENTRANCE, WITH THE KEITH SILICA LAMPS IN USE.

[The above exterior and the series of views on succeeding pages are from excellent photographs taken for the purpose by Messrs. John H. Avery and Co., of Hillmarton Road, London, N.]

THE OPENING DAY AND CEREMONY.

At last the first day of October arrived—the day of the opening of the National Gas Exhibition, which is the result of a great co-operative effort on the part of all sections of the industry. As the entrance to the International Exhibitions Halls was approached between 10 and 11 o'clock in the morning, it was clear that the final work was well in hand. A host of men had been working the night through; and they were departing in practically a constant stream from the scene of their labours in helping to build up this unique display. Inside the pretty entrance hall was a guard of honour of the Rangers (12th London Battalion) drawn from the Beckton Gas-Works, the Beckton Chemical Works, and the Nine Elms Gas-Works of the Gaslight and Coke Company. The men were under the command of Captain Edgell, and Second-Lieut. Hunter. On entering the hall, the very first person to be greeted was Mr. James W. Helps, who was the moving spirit and mainspring in the organizing of the Earl's Court Gas Exhibition in 1904. Him we were particularly glad to see on this occasion, for old associations' sake. Looking round, one could not but be surprised to see the vast change that had occurred in the final few hours. Dust had taken flight, the floors were covered, the industrial exhibits in the first large halls only required a little more work upon them to give them the ultimate appearance that will meet the gaze of the public during the next few weeks. The engines on the "National" and Crossley stands were running merrily and smoothly as though they had been in working condition for weeks, instead of hours only. The industrial stands were almost ready to commence operations; the girls in their white dresses from the Welsbach factory (to be followed in turn by

girls from the works of Messrs. Curtis's and Harvey) and of the Volker Company were getting ready to begin operations; and all through the big hall things were shaping for public inspection. Between the National Company's stand and the meter makers' stand, the bandsmen of H.M. Scots Guards were taking up their positions; and, under the conductorship of Mr. F. W. Wood, they were soon enlivening the place by selections of music.

Passing along the hall, members of the Institution of Gas Engineers and of the Society of British Gas Industries were met, many of them wearing medals—not specifically for distinguished service, but denoting membership of the Reception Committee, of the Executive Committee, and of the General Committee. There were also several men whom the new commercial life in the gas industry has brought into the front ranks of its workers. There was, for example, Bailie Paxton, the Convener of the Gas Committee of the Glasgow Corporation, Mr. Councillor Kay, the Chairman of the Manchester Corporation Gas Committee, and Mr. Alderman W. Armitage of Doncaster. But we must be forgiven if we do not notice more personally, for in the mass of men and the enthusiasm of the time, one hardly knows now whom one did meet or did not meet.

A Royal Message.

During the morning a telegram was dispatched tendering dutiful and loyal greetings to the King, and offering His Majesty and the Queen heartfelt thanks for their patronage to the exhibition and congress. In reply, the following gracious message was received by Sir Corbet Woodall:

Balmoral Castle.

I am commanded by the King and Queen to thank the President, Vice-President, Patrons, and Committee of the National Gas Congress and Exhibition for their loyal message, and to assure them that their Majesties hope that every success may attend their exhibition.—Stamfordham.

AFTER THE RECEPTION BY SIR CORBET AND LADY WOODALL AT THE FOOT OF THE STAIRWAY LEADING TO THE ARCADE OF SHOPS.

Reception by Sir Corbet and Lady Woodall.

The hour of eleven had come. The President of the exhibition (Sir Corbet Woodall) and Lady Woodall had arrived, accompanied by Miss Woodall, Mrs. Henry Woodall, and the daughter of Mr. and Mrs. Henry Woodall, which young lady carried a beautiful bouquet of flowers, which she afterwards handed to the Lady Mayoress. This is anticipating an incident in a brilliant and interesting function. At the foot of the stairs leading to the arcade of shops, Sir Corbet and Lady Woodall stood, with the President of the Institution (Mr. Edward Allen) and Mrs. Allen, Professor Harold B. Dixon, M.A., F.R.S., the President of the Society of British Gas Industries, and Mr. W. D. Helps, the Chairman of the Society. Mrs. M. A. Cloudesley Brereton was one of the group. Individually, the large number of representatives of the industry—gas administrators, gas engineers and managers, and the manufacturers of plant and appliances—were received by Sir Corbet and Lady Woodall. While this was proceeding, at the top of the stairs stood in a mass the attendants, the lady cooks, and hospital nurses and others who will be taking part in this attractive and realistic demonstration for public instruction. Many of those who had been received found good points of 'vantage on the stairs, and looked down upon the animated scene below. There was a movement in the throng, and presently there were seen coming up the hall the scarlet-gowned Mayors wearing emblems of office, mostly accompanied by their ladies, from numerous London and provincial boroughs. This first contingent of the chief representatives of municipal life, it is understood, comprised the Mayor and Mayoress of Battersea, of Bethnal Green, of Bury St. Edmunds, of Camberwell, of Chatham, of Chelsea, of Croydon, of Finsbury, of Greenwich, of Guildford, of Hackney, of Hammersmith, of Hampstead, of Lambeth, of Leicester, of Lewisham, of Islington, of Margate, of Pontefract, of Poplar, of Paddington, of Smethwick, of Southwark, of St. Pancras, of Stepney, of Stoke Newington, of Wandsworth, and of West Ham. All were heartily received.

Then the stalwart figure of the Right Hon. the Lord Provost of

Edinburgh was seen in his gorgeous apparel; and afterwards his brother in office, the Right Hon. the Lord Provost of Glasgow. Then came the Lord Mayor and Lady Mayoress of Cardiff, the former resplendent in his robes of office. The name of the Deputy Lord Mayor of Newcastle was among those on the list of guests. The trouble in his city prevented the Lord Mayor of Dublin coming; and he wrote to Sir Corbet expressing his regret at absence. There were also members of several of the professional and learned societies present.

Meanwhile, the Chairman of the Reception Committee, Mr. D. Milne Watson, the Chairman of the Executive Committee (Mr. F. W. Goodenough), and the Vice-Chairman (Mr. H. M. Thornton), had been receiving the Lord Mayor (Sir David Burnett, Bart.) and the Lady Mayoress, the Sheriffs, and his Lordship's official retinue, at the entrance to the Exhibition Buildings. It was a stately procession that presently passed up the hall; and the chief of municipalities and the Lady Mayoress were soon being presented to Sir Corbet and Lady Woodall. It was a good scene. In the constitution of the gathering, there was expressed goodwill, and the wish of an abundant fulfilment of the industry's aspirations to make itself still more felt (great as its service is felt already) in the life and work of the people and country. There were rejoicing and enthusiasm over the whole of this ceremonial inauguration of the work of celebration, of demonstration, and of educational endeavour. There was also in it good omen.

With the thronged stairways as a background, the Municipal representatives in their brilliant array a central feature, the Lord Mayor and Lady Mayoress and the President and Lady Woodall in the front, the scene was photographed; and we have pleasure in reproducing the picture among the records of this unique occasion.

Through the Exhibition.

Headed by the President, the civic dignitaries, and the other guests, a long procession then passed through the exhibition. Along the arcade lined with its splendidly-equipped shops to demonstrate shop lighting passed the visitors out into the pretty scene with the country cottage on the right and in the centre the exhibit of the Sulphate of Ammonia Committee—proving, by remarkable examples of the earth's produce, the developing power of the fertilizer manufactured by the gas industry—and then through one of the corridors running between the sumptuously decorated rooms of the town house or flat, demonstrating the use of gas for lighting, heating, and hot water supply. The guests could not help lingering here for a brief space. All was so inviting, and apparently so real, even in the nurseries and the less important of the domestic apartments. So on past the model dwelling, the smaller town house, and the workman's dwelling. Presently, the visitors emerged into the hall lined with the various illustrations of hospital work in which gas plays a part, the offices, the schoolrooms, the gas-fire stand, the historical collection, and the photometer and chemical laboratory exhibits, as well as the photographic displays of the heavier engineering work. Here and there the visitors stopped to examine some of the more attractive items in this unprecedented (on such large scale for the British gas industry) means of conveying and impressing upon the mind the utility and advantages of town gas.

A little further on, we came to the conference and lecture room, which was soon filled to the utmost of its seating capacity.

The Exhibition Declared Open.

On the floral-decorated platform, the President was in the chair, with the Lord Mayor of London and the Lady Mayoress to his right-hand side. Others occupying seats on the raised daïs included: The Lord Provost of Edinburgh and Mrs. Morison Inches, the Lord Provost of Glasgow, the Lord and Lady Mayoress of Cardiff, the Deputy Lord Mayor of Newcastle-on-Tyne, Sir W. Haswell Stephenson, the Chairman of the Newcastle-on-Tyne Gas Company, Mr. H. E. Jones, Mr. Councillor Kay, of Manchester, Sir Alfred Keogh, Mr. and Mrs. Edward

SIR CORBET WOODALL (THE PRESIDENT OF THE EXHIBITION) ADDRESSING THE MEETING AT THE OPENING CEREMONY.

[The Lord Mayor of London is seated to the right-hand side of the President.]

Allen, Mr. W. D. Helps, Mr. F. W. Goodenough, Mr. H. M. Thornton, Mrs. M. A. Cloudesley Brereton, Professor Harold B. Dixon, Mr. D. Milne Watson, Mr. A. A. Johnstone, of Brentford, and Mr. F. W. Bridges.

The President: It is with great satisfaction I see so large and representative a gathering on this our opening day, to wish success to our venture; and, in the name of the Committee, I bid all our guests a very hearty welcome. To the Lord Mayor we are especially grateful that he has spared time, upon which, we know, so many demands are made, to dignify this congress and exhibition with his presence, and to help it by his words of goodwill. The position of the Lord Mayor of London is a high and important one—a fact which is recognized abroad as well as at home; and the people know that its prestige is not lightly lent. We venture to think that this honour is deserved by the importance of the gas industry of this country, representing, as it does, the remunerative employment, with few relatively unimportant exceptions, of all the capital directly invested in it, now exceeding £140,000,000 sterling, to which must be added the large supplementary investments in manufacturing businesses accessory to our own. It is probably within the mark to put the employment given in these united industries at more than 300,000 workers. To the Lady Mayoress and the other ladies who have graced our gathering we are much indebted. To our other guests, the Lord Provosts of Edinburgh and Glasgow, the Lord Mayor of Cardiff, the many Metropolitan and Provincial Mayors, and all others who are here—many from places far removed—to show their goodwill, we offer most sincere thanks. We believe they will find in an investigation of the exhibits recompense for their pains. I will say nothing now of the exhibition itself and its aims. You have seen this morning something of what will be brought together, and you have probably read the notices of the lectures and conferences that will be held. At these, matters industrial, hygienic, and otherwise will be discussed by men the most capable for the task; and the issue cannot fail to be of great public service. This exhibition connotes on a large scale a changed system under which gas companies are regulating their relations with the public, illustrations of which change are to be seen in practically every town in the kingdom, and, indeed, in every place possessing a gas supply. In the old days, persons desiring a service of gas were expected to make application to the Company, to comply with many forms and conditions, and to be grateful when, in due time, the supply was given to them. Anything like canvassing or advertising would have been considered unnecessary, if not distinctly vulgar. [Laughter.] To-day we meet everywhere more or less attractive show-rooms in which appliances for lighting and heating are to be seen, and explained by intelligent—again more or less—attendants to expatiate on their virtues. We have a British Commercial Association, supported with a large income by corporations and companies supplying gas, which organizes demonstrations and advertising on a large scale. There are scores of able, attractive, and energetic ladies ready to visit the houses of consumers, and exhibit the many advantages of the gas-stove, and explain to cook or mistress how to improve the cuisine. It may, I think, occur to some that the more conspicuous of these many aids to the consumer had their origin about, and subsequent to, 1880, and that the latter happened to be the date when the undisputed reign of gas in the region of lighting was seriously threatened. I will not stay to inquire if the two circumstances had any relation to each other. I will content myself by saying that the alteration is all to the good. This exhibition, showing as it does the strides which have been, and are being, made in the applications of gas for lighting and for domestic and industrial purposes, will be a surprise to many of those who have thought themselves well informed. All these matters will be dealt with fully in the lectures which form an interesting and most valuable feature of the work of this congress. Your attention was drawn, my Lord Mayor, to an illustration of the lighting of a

small dwelling, fitted with a prepayment meter. The story of the application of these meters (with their enormous convenience) to the poorer consumers, and their not inconsiderable profits to the gas undertakings, is almost a romance. It is only a comparatively short time since they were first available for public use; and at the present time I find that in London only, disregarding the Suburban areas, there are received, on the average, over a million-and-a-half pennies daily, of a value of £6500, and weighing 13¼ tons. I will now ask you, my Lord Mayor, to declare the exhibition open. But I should be wanting in regard to the fitness of things if I failed to take this first opportunity of acknowledging the untiring zeal with which the Joint Committee have laboured to achieve a success. The unselfish manner in which personal interests have been subordinated to the general good has been most cheering to look upon, and will bear further fruit after the doors of our show are finally closed. The inspiring spirit, the exemplar of indomitable energy, has been, by universal consent, the Chairman of the Executive Committee (Mr. Goodenough), whose work has placed the whole industry under a heavy debt of gratitude which will not be forgotten.

The Lord Mayor, in reply, said: In the first place, I have to thank you, Sir Corbet, for your very kind words of welcome. I can assure you it has afforded my colleagues, the Sheriffs of the City of London and their ladies, as well as the Lady Mayoress and myself, the greatest possible pleasure to be here to-day on the important and very interesting occasion of the opening of the National Gas Exhibition, which demonstrates the great progress that has taken place during the past half century in your great national industry—a progress which one can hardly realize. The figures which we have just heard from you, Sir Corbet, are amazing. Our pleasure to-day is greatly increased by meeting so many of the Metropolitan Mayors, and also the Lord Provosts and Lord Mayors and other of my brother workers in the municipal life of the country, and it shows their recognition of the importance of this exhibition—the importance of it to the public over whose lives and happiness they have to preside. Obviously, to make a speech dealing with this great exhibition, I ought to have had more than an hour's walk round it. It is a great and a beautiful picture; but I am too close to it to realize all its beauties and potentialities. However, we must all have seen sufficient of it to know that the exhibition must be productive of the greatest possible good, seeing that it focuses the view and the interest of the general public on the marvellous progress and improvements which have taken place during recent years in the production and

AN EARLY VIEW OF THE INDUSTRIAL HALL, LOOKING TOWARDS THE ENTRANCE.

application of gas for illumination, cooking, heating, industrial, and other purposes—matters which are of the most vital importance to the people, as they have the most important effect upon their economy and their comfort. These great improvements have not in any way been thoroughly realized by the public; but this exhibition will enable the public to better realize them. The exhibition must also be of the greatest possible advantage to all engaged in the industry, because it gives them an opportunity of meeting together for the interchange and exchange of ideas, with the inevitable result that it must have a great stimulus in further improvement and further invention. You, Sir, in your speech referred to what is little more than a revelation in connection with the comfort of the people—that is, in regard to what you more eloquently term the prepayment system, but which we know better as the penny-in-the-slot system. [Laughter.] Well, the terms mean much about the same. This system has the greatest influence upon the life and the happiness of the working man. My brother mayors know, but it may not be generally recognized, that, if one wants any great improvement, the first thing is to educate. Education means the desire for culture and more happiness; and what the gas industry is doing largely assists in the achievement of this end. Speaking from my own practical knowledge, there are young married people—ladies and gentlemen in the best sense of the word—of refinement but small means, who are now enabled to obtain a really delightful house of small accommodation, and, with the aid of gas for cooking and heating, are enabled in many cases to do without a servant. Now that is a real and substantial advantage. I could go on and say much more on this topic; but I must conclude, Sir Corbet, in most sincerely congratulating you, and all associated with you, in the conception and the completion of this dignified and wonderful exhibition. In the assurance which I possess that this exhibition will be not only a great advantage to those engaged in the industry, but a great good to the people, I now formally, and with the greatest pleasure, declare it open to the public. [Loud cheers.]

The Lord Provost of Edinburgh (Mr. Robert Kirk Inches) said: An honourable and very pleasing duty has fallen to my lot to-day, in the name of Scotland, in supporting the Lord Mayor of London in wishing success and prosperity to this vast exhibition, which demonstrates, in a manner never before shown, the manifold purposes to which gas can be applied. Although Scotland cannot claim a century of gas lighting, as this exhibition has been inaugurated to celebrate, it is an accepted fact that she rightly claims the birth of its inventor, and he who first intro-

duced it to practical purposes, in the person of William Murdoch, who was born on Aug. 21, 1754, near Old Cumnock, Ayrshire. I think it was in 1792, while he resided in Cornwall, that he first made a practical application of gas lighting. On his return to Scotland in 1797, he lighted his own premises at Old Cumnock with coal gas; and in 1798, being engaged with that celebrated firm of steam-engine fame, Messrs. Boulton and Watt, he there erected an apparatus upon a somewhat pretentious scale for the lighting of the premises. The first public display of gas lighting occurred in 1802, when the premises of Messrs. Boulton and Watt, near Birmingham, were magnificently illuminated in honour of the Peace of Amiens. The first application to Parliament for a public supply appears to have been made in 1809; and it seems to have created considerable public excitement. The poisonous, inflammable, and explosive properties of gas appear to have so alarmed the public at the time—assisted no doubt by the most appalling pictures that were drawn by the Press of the day, foretelling the dire calamities that would befall them should such statutory powers be granted—that it is not surprising to find that, from this and other causes, the application was not successful. In 1812, however, a Royal Charter of Incorporation was granted to what we now know as the Gaslight and Coke Company, of which the President of the Exhibition—Sir Corbet Woodall—is the honoured and invaluable Governor, and who, at the end of a century of his Company's existence, points the finger with no unerring nerve to the course along which its future prosperity lies. It may be interesting to note that Scotland, true to its traditional caution, followed closely in the wake of London in the application of gas for public purposes; the Edinburgh record starting in 1818, and I believe Glasgow some little time before. [Laughter and cheers.] Our great writer, Sir Walter Scott, did not consider it beneath the dignity of literature and his great achievements to become commercially interested in gas supply. He was Chairman of the Edinburgh Oil Gas Company, which was formed in 1824, and which was afterwards acquired by the Edinburgh Gas Company, of which the Gas Commissioners are its successors to-day. Among other things, the Commissioners still make use to-day of the very Board Room furniture that was used by Sir Walter Scott and his directorate; and the chair which he used as Chairman has attached to it a silver plate suitably inscribed. The present exhibition and all it contains demonstrates in the most striking manner the enormous advance that has been made by latter-day administrators, and those with whom they are associated in the scientific application and

A VIEW FROM THE ENTRANCE END IN THE INDUSTRIAL HALL.

common-sense methods of using gas for any and every purpose. Its importance as a civilizing agent has perhaps never been realized properly. Its necessity for the safety and welfare of the community is perhaps better understood than its civilizing agency. Its industrial application is, in my view, only in its infancy. We have passed the stone and various other ages; and I think it may now be truly claimed that, without doubt, we are at the commencement of the gas age, for I find that in one form or another, be it made from coal, or oil, or other substances, all sources of light, heat, and power will have their origin in some form of gas. Even your great competitors, and in many respects benefactors, electricity, must cease to use raw fuel for the generation of their steam, and first proceed to treat their coal for the recovery of those valuable bye-products for which the world is clamouring, but which now are unfortunately entirely lost financially, and which go so far to besmirch our atmosphere and public buildings. I understand that one of your great objects is the purification of the atmosphere of towns by the substitution of gaseous fuel for the present methods in which we employ coal for domestic and trade purposes. Much has, I understand, been done—particularly in the great towns of England and Scotland; but there yet remains an enormous field for the development of these principles. The object of this great exhibition—inaugurated with the help of gas companies, gas corporations, and those interested financially and professionally in the gas industry, is not only to stimulate yourselves to higher efforts, but to demonstrate to your constituents the vast possibilites which lie to their hand in the economic service and hygienic conditions under which much of the domestic labour of a household or factory can be saved. Your efforts in the public interest deserve every success—your demonstration will command success; and, in the voice of Scotland, I wish it in all sincerity the success it deserves.

The PRESIDENT: I have received the following letter from the Lord Mayor of Dublin:

> I much regret that, owing to circumstances prevailing in this city, it will be impossible for me to be present at the opening of the gas exhibition on Wednesday. I need hardly say, I wish the undertaking every success.

I think it would perhaps be gratifying to his Lordship if, in expressing our regret at his absence, we wished him a successful issue out of the embarrassing and very trying circumstances in which his city has been for some time involved. [Hear, hear.]

The LORD MAYOR OF CARDIFF (Mr. Morgan Thomas): I want on behalf of the little country I represent to offer our sincerest

congratulations upon the occasion of the opening of this magnificent exhibition. We of the Corporation in Cardiff are rather blaming ourselves—or rather we are blaming our predecessors, for not having, some years ago, bought up the Cardiff Gas Company when there was the opportunity. The Cardiff Gas Company is undoubtedly one of the best in the country—a Company that has kept well abreast of the advancement of science in connection with gas; and I am only sorry we do not possess the undertaking as a Corporation. It was said, Mr. President, some years ago, when electricity came to be used for lighting purposes that the gas undertakings of the country were doomed. I think that the advent of electricity for lighting has been a great godsend to the gas companies of the country; for it has set their wits to work, and caused scientists to think, and to probe into the best modes of producing gas, and putting into it the highest illuminating power. In many of our towns, we see to-day gas superseding the electric light, which only goes to prove what a tremendous advance you have made in the production of gas since your great competitor came into the field. I am sure this exhibition cannot but be conducive to a great educative stimulus, judging by the syllabus of lectures that has been drawn up. I hope to try and attend some of them myself; for I feel that they cannot but be productive of great good for the nation. I wish the exhibition every success. I want, too, to pay a personal tribute to the excellent Chairman of the Executive Committee (Mr. Goodenough). It would have been practically impossible for him to have done more than he has done for the comfort of the visitors, and for their information and interest. I feel it a great honour to join my Lord Mayor of London and the Lord Provosts of Scotland, in wishing every success to this great undertaking. [Cheers.]

Mr. Edward Allen (President of the Institution of Gas Engineers) proposed a vote of thanks to the Lord Mayor of London for his great kindness in opening the exhibition. They were exceedingly grateful to him, knowing how many and important were his duties, for having spared some of his time for this purpose. They were also gratified that he had been supported so largely by Lord Provosts, Lord Mayors, and Sheriffs representing other parts of the United Kingdom. The traditional interest taken by the Lord Mayors of London in the industries of the country was well known; and they were glad that, in respect of their own industry, and of the effort they were making this month, they had the support of his Lordship. They knew his Lordship was drawing near the end of his strenuous year of office; but he (Mr. Allen) ventured to think and to say that his Lordship had not attended many more important functions than he was doing that day. They knew his presence there was principally caused by his interest in the public generally, and his wish to help on a great public benefit. He would not follow the Lord Provost of Edinburgh in the eloquent and exhaustive manner in which he had treated the exhibition from that point of view; but he (Mr. Allen) need not say that gas men entirely agreed with him. They were of opinion that the age of gas had arrived. As gas men, they knew all about it; and they hoped that the exhibition would enable the public generally, and especially the professional men of the country, to realize all that the gas companies were doing for them. They would take this opportunity of congratulating the Lord Mayor of London upon the honour recently conferred on him by the King—an honour which they were sure he had merited not only by a strenuous year of office, but by the record he had behind him.

Professor Harold B. Dixon (the President of the Society of

THE APPRENTICES' WORKSHOP IN THE INDUSTRIAL HALL.

British Gas Industries), in seconding the motion, remarked that he feared his words would be somewhat halting but, however limited they might perforce appear in quantity, they were genuine in quality. The kindly act that the Lord Mayor had performed that day in opening the exhibition would, he thought, have brought home to all of them the fact that they were making a remarkable departure in two senses of the word. In the first place, the exhibition was not a mere collection of different competitors' goods—it was not an organized advertisement regarding individual designs; but it was, he hoped and trusted, a series of object-lessons in the progress that had been achieved in the problem of the domestic use of gas. In the second place, he thought it marked the definite end of the era when gas companies and allied industries were wont to pick up scientific tips, and use them perhaps haphazard, but were not inclined to make systematic researches into their own problems. He thought this era was over; and he fully believed that both manufacturers and men of science had grown dissatisfied with the atmosphere of distrust in which they had met. The industries were demanding men who could tackle new problems, and were not afraid to face new research; and the new universities, on the other hand, recognized that industries were really the structure which supported the sinews of science, and even the fair features of art. They knew in history that the greatest industrial and commercial communities had been the centres of inspiration for science and art; and they knew too that science and industry must progress together. That they did progress together was for the advantage of each. Because the faith was strong in them, that science and industry must go together, they welcomed there that day the representative of the greatest centre of industry and commerce the world had ever known; and they heartily welcomed him for the interesting and encouraging words with which he had made the meeting ever memorable.

On the President putting the motion to the meeting, there were cries of "All," followed by three loud cheers.

The Lord Mayor said he was grateful for the kind manner in which they had received this vote of thanks. His brother of Cardiff referred to the fact—for undoubtedly it was a fact—that a great deal of the prosperity of the gas industry was due to competition. He believed this to be perfectly true; he believed that competition was the salt of the earth. At the present time, the municipal life of this country was sufficient to attract the very best men to enter its service; and so they had competition. He himself was surrounded by 26 competitors—all men of shining light, and men earnestly devoting their abilities and time to the improvement of social life. With such shining lights around him, it became incumbent on the Lord Mayor of the Mother of Corporations to keep his light shining to the best of his ability. The assurances given him that day were a great encouragement to him to hope that his lamp would still keep burning for the few remaining weeks of his life as the Lord Mayor of London.

THE INAUGURATION LUNCHEON.

Luncheon was shortly afterwards served in the banqueting hall. This spacious place is decorated with crimson coloured walls, and has muslin draped roofs, through which depend Milne's new "Nonpareil" ventilating-lamps. On the walls are candle bracket lights; but the more imposing decoration are the oil portraits and prints. On the wall opposite the chair is an oil painting of Sir Corbet Woodall, with, on one side, Sir George Livesey, and upon the other side the oil painting recently presented to

Mr. Thomas Newbigging. We see portraits, too, of half-century men in the chairmanship of Gas Companies—Dr. J. Oakey Taylor, fifty years Chairman of the Reading Gas Company, and Dr. Statter, the Chairman for a like period of the Wakefield Gas Company. Reminding of the now distant history of the industry are portraits of Simon Adams Beck, the Governor of the Gaslight and Coke Company from 1860 to 1876; of Timothy Stansfeld, the first Chairman of the City of London Gaslight and Coke Company; of Joseph Gratton, the Chairman of the Independent Gaslight and Coke Company; and of Thomas Hawksley, the first President of the British Association of Gas Managers. Pictures are there of Baron Auer von Welsbach; and of Professors Arthur Smithells and Harold B. Dixon. In this excellent company, too, there are prints of Mr. W. D. Helps (the Chairman of the Council of the Society of British Gas Industries), Mr. H. James Yates, Mr. Thomas S. Clapham, and Mr. Charles Clare.

When the guests were seated, the tables were full; and so it may be taken that there were approximately 500 present.

The PRESIDENT (Sir Corbet Woodall) was in the chair.

To his right-hand side at the top table were, according to the printed plan:

The Rt. Hon. The Lord Mayor of the City of London, Lady Woodall, The Rt. Hon. the Lord Provost of Edinburgh, The Lady Mayoress of Cardiff, Edward Allen, Esq., M.Inst.C.E. (President of Institution of Gas Engineers), The Mayoress of Hammersmith, The Mayor of the City of Westminster, Sir William Bull, M.P., Mrs. Humphrey, Alderman George Harkus, J.P., Sir W. Haswell Stephenson, J.P., Mrs. H. Woodall, Sir Hugh Owen, G.C.B., F. W. Goodenough, Esq., Sir John Collie, M.D., J.P., Sir Henry Wood, M.A., Sheriff F. G. Painter, A. C. Morton, Esq., M.P., C.C., H. E. Jones, Esq., M.Inst.C.E., Councillor William Kay, J.P., Robert Elliott-Cooper, Esq. (President of Institution of Civil Engineers), W. Duddell, Esq., F.R.S. (President of Institution of Electrical Engineers), H. M. Thornton, Esq., J.P., G. Crispe Whiteley, Esq., Percy B. Tubbs, Esq., F.R.I.B.A. (President of the Society of Architects), W. Edward Woolley, Esq., (President of Institution of Surveyors), Dr. C. W. Kimmins, William King, Esq., J.P., D. Milne Watson, Esq., John Young, Esq.

To the left-hand side of the President were: The Lady Mayoress of London, the Rt. Hon. the Lord Provost of Glasgow, Mrs. Morison Inches, the Rt. Hon. the Lord Mayor of Cardiff, Mrs. Edward Allen, Professor Harold Dixon, M.A., Ph.D., F.R.S. (President of Society of British Gas Industries), Mrs. M. A. Cloudesley Brereton, the Mayor of Hammersmith, Miss Woodall, Sir Daniel F. Goddard, M.P., Surg.-Gen. Sir Alfred Keogh, K.C.B., LL.D., M.D., John Miles, Esq., Sheriff Lieut.-Col. J. Humphrey, Alderman Sir John J. Baddeley, J.P., James Douglas Walker, Esq., K.C., Sir H. F. Donaldson, K.C.B. (President of Institution of Mechanical Engineers), Professor Silvanus Thompson, D.S.C., F.R.S., Bailie T. Paxton, Herbert Jameson Waterlow, Esq., W. D. Helps, Esq. (Chairman of Council Society of British Gas Industries), Arthur J. Martin, Esq., M.Inst.C.E., Professor Leonard Hill, M.B., F.R.S., Charles Hussey, Esq., J.P., Professor Henry Kenwood, M.B., F.R.S.E., D.P.H., Dr. William Garnett, Professor Raphael Meldola, D.S.C., F.R.S., W. E. Price, Esq., A.M.I.C.E., Henry Woodall, Esq., Miss Mary Woodall.

During luncheon, the Band of the Scots Guards played the following selection of music:

1.	MARCH	Le Régiment Favori	*Ertl*
2.	VALSE	Smiles, then Kisses	*Ancliffe*
3.	SELECTION	Il Trovatore	*Verdi*
4.	UNGARISCHE TÄNZE	Nos. 5 and 6	*Brahms*
5.	SERENADE	Beneath Thy Window	*Capua*
6.	VALSE	Schatz	*Strauss*

After luncheon, the loyal toasts were duly honoured; the President remarking upon the interest that both the King and Queen took in industry, and which interest was further exemplified by the fact that their Majesties were patrons of the exhibition.

SUCCESS TO THE CONGRESS AND EXHIBITION.

The LORD PROVOST OF GLASGOW (the Right Hon. D. M. Stevenson) proposed "Success to the Congress and Exhibition." He remarked that, in the admirable and instructive address of Sir Corbet Woodall at the opening of the exhibition that morning, there were several things regarding the usefulness of gas, and its faithfulness as a servant. This was so, whether they regarded the matter from the domestic, educational, industrial, or communal aspects. Gas had become a municipal article which especially appealed to him. The Glasgow Corporation had a gasworks; and the aspect in which they especially appealed to him was in connection with smoke abatement. The sun was the best sanitary officer they could have; and if they could persuade their citizens not to use coal but gas for heating, they would have much more sunshine, and the health of the citizens would be better than it was even now. He was therefore delighted to hear what had been said about the application of gas for cooking and heating, as all advance in this direction was a help to the country. There was another thing that appealed to him. It was that municipalities were always glad to help one another. In this they, as a rule, differed from the private trader. The private trader, having got a good thing, kept it to himself; but if a municipal Council got a good thing, they informed other municipal bodies, who were also at liberty to take advantage of it. In this way, they helped forward the good work. The present exhibition was built on this principle. It was perhaps the first time that they found municipal and private industrial enterprise acting on the principle of helping one another. In this exhibition, they had the best apparatus and appliances of all kinds at disposal; and they had in attendance a class of men who had no desire to push one thing more than another, but were ready to show the visitors all that was best in the exhibition. They ought to thank the Committee for having brought together one of the finest shows he had ever seen in this particular line. Since electric competition had first of all set in, the demand for gas had been greater than ever; and now they also saw engines driven by gas generating electricity. Ever since the introduction of electricity for lighting purposes, the methods of using gas for lighting had been constantly getting better than before. The previous evening, he drove through Whitehall—thanks to Mr. Goodenough—and there he saw an installation of gas lighting which he thought was not to be excelled anywhere in Europe. He was in Canada only the previous month; and he had taken the occasion since his return to tell the citizens that they might take lessons from Canada in the lighting of streets. The lighting he then had particularly in mind was by electricity. But he thought that the lighting committees of public authorities throughout the country might consider whether they could not with advantage adopt the system of high-pressure gas lighting, which he ventured to say was unrivalled in its excellence for street illumination. As to other purposes, no well-regulated household should be without a gas-cooker and other appliances for cooking and heating, whether the houses were great or small. Their use meant economy. The exhibition which they had now before them had meant hard work on the part of certain of the members of the Committee—work which had been beyond praise. If ever an exhibition deserved success, this one did.

Sir W. HASWELL STEPHENSON, the Chairman of the Newcastle-upon-Tyne and Gateshead Gas Company, remarked that it was a most distinguished honour to be called upon to support this toast. Regarding the exhibition as he walked through the many passages and corridors that morning, he felt he was like the Queen of Sheba. She heard of the wonderful wealth of Solomon, of his power, dignity, and honour; and she determined that she would go and see how the land lay. When she got there, she was completely overwhelmed; and she said the half had not been told her. This was the position that he (Sir William) was then in. He had no idea that the exhibition was to be anything like this; and what therefore could he add to what had already been said? He remembered the exhibition that took place in 1882 at the Crystal Palace. It was less pretentious than the one held at Earl's Court in 1904. Since that time other exhibitions on a smaller scale had been held not only in London but in the Provinces. But it seemed to him the present one was the most complete. And why? Because it was simply a great co-partnership of those interested. From the information supplied by the valued Chairman of the Executive Committee, he gathered that the exhibition differed from all others, inasmuch as the goods were not exhibited by competitors. What they had there was a selection of appliances forming a harmonious whole; and it showed that gas supply was a force in the country which contributed to the joy and comfort of the whole community. They had heard that day, too, that the exhibition celebrated the centenary of the public introduction of gas into the country, and fifty years of the life of the chief technical gas organization. He wondered what would happen in the next fifty years. A most eloquent and satisfactory account of the exhibition had appeared in "The Times." The writer of the article hoped that something would be done to improve the quality of gas coke, because he said something ought to be done to cause it to be used more where coal was being consumed now. If coke could be so purified and made fit for more general domestic use, work in this direction, he thought, would not be in vain. He remembered well the introduction of electricity, when it was considered by some people that the gas industry was never going to hold up its head again. It looked as though the boot was now on the other leg. The gas industry only wanted a fair field and no favour. It only wanted the same opportunities extended to it as were accorded to other industries. He saw nothing but a bright and successful future before gas undertakings; and with the energy and the ability that were imported into the industry by such men as their President and others, he felt quite persuaded that, as light followed the night, so the future of gas would much exceed anything that had been done in the past.

THE ECONOMY AND WORK OF THE INDUSTRY.

The PRESIDENT, in responding on behalf of all concerned in the exhibition, said: The members of the Committee are deeply grateful both to the Lord Provost of Glasgow and to our friend Sir William Stephenson for the encouraging words they have used. I thank them most heartily. I should much have liked to follow what I said this morning by a few more observations upon the nature and the possibilities of the industry we are here representing. But as I know that the Lord Mayor has another engagement in the city, I will spare you the infliction. However, I must say that it is no mean industry that we represent. Among the chief of its features is, in my opinion, its supreme economy in respect of the national coal capital. We waste nothing that the

science and skill of our chemists can show us how to put upon the market at a paying price. Instead of squandering half or three-quarters of the coal, as mere fuel users do, we are able to account for and recover, in one form or another, every ounce of our material. Proof of this claim is afforded in the exhibition. We further claim that gas supply, as carried on, is a great and wholly beneficent public service. Its growth and development during the hundred years that have elapsed since the first gas company—the original of the vast undertaking over which I have the honour to preside—received a Royal Charter, have been continuous. To paraphrase a famous remark, the light that was then lighted in this Metropolis has never gone out; and let me express the hope and the belief that it never will. So far from showing any weakening, it has grown stronger, and bigger, and brighter. Again I must refer to the exhibition for examples. We show there how and why our light has not only been kept burning, but has brightened ten, twenty, and even forty fold, the original illuminating power which the Legislature still, almost humorously, continues to regard as its standard lighting value. Within recent years, the applications of gas as a clean, efficient, cheap, and, above all, handy fuel for industrial and household purposes has grown enormously, and is still growing. While we are sitting here gas fires and cookers are being fixed everywhere. What these conveniences mean to town dwellers we shall endeavour to illustrate by the various cooking competitions, open to all comers, to be held daily through the month. My Lord Mayor, it must interest you, as the head of the most truly democratic municipality in the world, to be reminded that the gas industry is a strictly popular one in every good sense of the word. It has never appealed to aristocratic favour, nor does it owe much to eminent political or even scientific assistance. Happily, too, it has no exciting financial history; there has never been a gas "boom." Started over a century ago by a little company of undistinguished persons, it has kept its money securely, and stands to-day as one of the most popular investments for the savings of the people of England. Anyone who wishes can buy gas stock as easily as any article in a shop. When he gets it, at auction or otherwise, he will learn that the rate of his dividend will depend upon the selling price of gas, but in the inverse ratio; so that the lower the price of gas, the higher the dividend. Not many businesses are carried on under such conditions. The proportion also of benefit is largely in favour of the public. According to the moral of a well-known play, "Halves, partner" is fair sharing; but the gas proprietor only gets about one-sixth of the amount of money represented by a reduction in the price of gas. Gas supply by companies in the country is, therefore, a truly co-operative matter; and I am not sure that in this way the community does not reap even more advantage than would follow from general municipalization of the service. I do not say this by way of reflecting upon municipalization where it has proved expedient, but only to emphasize the truth that there is more than one way of running a gas-supply undertaking to the general advantage. This by the way. At any rate, the splendid spirit displayed by the great gas-owning municipalities of the North and the Midlands represented here, in joining with the companies and the manufacturers of gas-works plant to make the exhibition a worthy presentation of the existing state and capabilities of the national industry, shows that all particular interests have been sunk in performing this act of faith in the industry. This, my Lord Mayor and gentlemen, is our justification for being here, and committed to this enterprise. We wished to make an opportunity of the centenary of public gas lighting, and the jubilee of the Institution of Gas Engineers, for giving some unmistakable evidence, as impressive as we could make it, of the faith that is in us. We believe in the future of our industry, not merely on account of its present technique, but also and more because it has the root of unsurpassed economy in its principles. It is likewise extending and deepening its hold upon the public; adapting itself with remarkable flexibility to the lines of social progress of successive generations. From a luxury of the prosperous middle class, gas has been raised into the status of a necessary of all classes. I need hardly say that this is not an anti-electric; it is a pro-gas exhibition. We recognize that there is room and a place for both gas and electricity in the service of the community. We use electricity for certain purposes in our works; the electrician uses gas largely in his works for the making of cables, dynamos, and lamps, while the consumer in many cases uses gas to produce electricity. The presence of so many among us to-day who are at the head of both gas and electricity undertakings is evidence of a community of interests between the two. To conclude these remarks, we rejoice that our prosperity has enabled us to take a strong lead in a very special and far-reaching improvement of the conditions of our labour force. Gas companies, in many examples, large and small, have taken their employees into partnership with themselves and their customers, by a voluntary enlargement of the sliding-scale principle. This is not an occasion for going into the details of this or any other attractive feature of our industry; but I must make a point of the salient fact that the British gas industry, in its latest administrative development, hangs by a triple thread of combined interests—namely, those of the proprietary, the customers (almost identical with the public at large), and the employees. Again, it must never be overlooked that these interests are at one with that of the community, inasmuch as they are all inextricably bound up with the cheapness of gas. Finally, I wish you, my Lord Mayor and gentlemen, to recognize the peculiar—I think I might safely say the unique—nature of the scheme of this exhibition. It is not, of course, a philanthropic enterprise; but it is a specially co-operative manifestation. There is only one exhibitor—the gas industry of this country. There are, we hope, two parties which will benefit by our venture—our industry and the public whom we serve. We may all hope to learn something from what there is to see and hear in these halls, not only on one side. On the contrary, we purveyors look to this opportunity for renewing and opening up fresh relations of mutual sympathy and confidence with our customers, whom we prefer to regard as clients, on the ground that their interest is ours. We wish to discover where our methods are susceptible of improvement from the point of view of the public; and also in what fresh fields we may expect to gain new victories. It is an experiment which we trust will be crowned with success in every way; and I cannot sit down without repeating my sense of the obligation under which you, my Lord Mayor, have placed us, by giving us, at the start, the encouragement of your kindly interest and helpful presence. May I say, in addition to the few words I have already expressed as to the obligation we are under to those gentlemen who have organized the exhibition, that we are also greatly indebted to a lady who is a member of the Committee, and who has rendered prominent service. I refer to Mrs. Cloudesley Brereton, who, through all hours of the day and evening, has been working unremittingly to make this exhibition a success.

The Lord Mayor of the City of London.

Mr. F. W. Goodenough said the task that fell to him was one which was very easy to perform, and that was to propose the toast of "The Right Hon. the Lord Mayor of the City of London." He (Mr. Goodenough) had one qualification for proposing the health of the Lord Mayor, in that he owed his hereditary connection with the gas industry to the fact that his great uncle was Engineer of the gas-works which occupied the site on which the City of London School now stands. He had therefore some special connection with the City of London in gas affairs. The Lord Mayor, too, had some, if not personal, official connection with the gas industry, because he (Mr. Goodenough) believed that it was in 1859 that the then Lord Mayor of London opened the works of the Great Central Gas Consumers' Company; and he read that, his Lordship having addressed the workmen present on that occasion as to the advantages of gas for many purposes, an entertainment followed which lasted into the small hours of the morning, with dancing and much festivity. They could not hope that the Lord Mayor on this occasion would cause history to repeat itself. [Laughter.]

Mr. W. D. Helps, Chairman of the Council of the Society of British Gas Industries, said he had great pleasure, in the name of the Society, in supporting the toast of "The Health of the Lord Mayor." He found it difficult to say how grateful and thankful they were at his presence among them that day, to open, and to give a push forward, this centenary celebration of the gas industry. He was sure that, as his Lordship had looked round the exhibition, he must have felt that the gas industry was full of light, heat, and power.

The Lord Mayor: For the personal part of this toast, will you kindly accept from me my most grateful thanks. This is not the first exhibition that I have attended during my mayoralty in connection with our great national industries; and my opinion is that a large amount of energy is being shown in those industries in the present day. Going back a few years, an incident occurs to me that will perhaps give you food for thought and reflection. I was present on that memorable occasion when His Majesty, then the Prince of Wales, made the speech in the Guildhall in which he said "Wake up, England!" You will observe that he did not refer to Scotland. [Laughter; and the Lord Provost of Edinburgh: "We are wide awake, Sir."] Scotland, in my opinion, has always been remarkably wide awake—even to the present, as exemplified by the speeches of my friends the Lord Provosts of Edinburgh and Glasgow. Well, Gentlemen, at the present time, I believe that, in trade and commerce, the nation is able to successfully hold its own against any nation in the world; so that we need not think that, after all, the country is going to the dogs. I have to attend another meeting now in furtherance of the Lyons Exhibition next year, and I think it will be a good thing if this industry is represented there.

Mr. H. E. Jones, Chairman of the Gas Companies' Protection Association, in proposing "The Visitors," said they were happy to see among them that day so many municipal leaders, and so many who were interested in the other side of the lighting business. It had also been particularly gratifying to them that this exhibition should have attracted so many scientific geniuses, to witness what was being shown regarding the domestic and manufacturing uses of gas. They could honestly say that their work and the products of that work were devoted to the use and convenience of mankind. Reflecting as an old man upon the great leaders of the past, he could not help wondering what they would have said could they have been at this exhibition. They would have said that there was not a great deal here which showed how to develop the manufacture of gas, but there was a great deal of illustration as to how to use gas. The exhibition marked an enormous development and the great change which had crept over the industry lately, and which had caused an extraordinary increase in the popular use of gas.

Mr. Councillor W. Kay (Manchester), in supporting the toast

considered that the best possible advertisement they could have given to the exhibition was the hospitality of that day.

Sir ALFRED KEOGH, K.C.B., LL.D., M.D., in responding for the visitors, said that it was a happy idea to include the ladies on this occasion. He was sure that he expressed the views of the visitors in wishing the congress and the exhibition every possible success. By the aid of the exhibition and the proceedings at the congress, the importance of the industry would be brought home. In every way, the visitors all earnestly hoped for the success of what was being done here; and they thanked the organizers for having invited them there that day.

The health of the President was then drunk with musical honours. Three hearty cheers were also given for Sir Corbet, and a special supplementary one for Lady Woodall.

The PRESIDENT: For all your kindness to me to-day, I am deeply grateful; and I rejoice very much that the opening ceremony of our exhibition has been, by the common work of many, so successful as, I think, it has been. I hope we shall all go away now to do all in our power to make the public know what it is we are prepared to do for them. [Cheers.]

The large company then dispersed; and for long after many of the visitors were seen exploring the various attractive scenes and exhibits in the unique demonstration.

NOTES FROM THE EXHIBITION.

When coming to town for the National Gas Exhibition, bring some of the local journalists with you.

There was a press visit to the exhibition on Monday afternoon and evening of last week—two days before the opening of the exhibition. The journalists were received by Mrs. M. A. Cloudesley Brereton; and, between two and nine p.m., there must have been some hundreds of "Knights of the Pen" passing through the entrance. Certain of them had travelled from the Provinces. Although the display was not in complete form—the furnishing, &c., having been delayed until Tuesday in order that it should not be exposed to the dust—the journalists were able to obtain a good impression of the vastness of the exhibition. The thing that appealed to them most was the demonstrative character of the show, without the wearisome repetition attributes of an ordinary exhibition. With every move something different meets the eye here, instead of so many stands with a strong family likeness. It looks as though the gas industry has set a new fashion in this line of making public displays.

VIEW IN THE ARCADE OF SHOPS.

Among those noticed escorting journalistic and other visitors about the halls on Monday last week were the Chairman of the Executive Committee (Mr. F. W. Goodenough), the Vice-Chairman (Mr. H. M. Thornton), and Mr. H. James Yates and Mr. Cyril G. Davis, members of the Executive. The industry owes something to men who devote time to furthering the general interests, in whatever capacity.

From the London County Council, there was on the same day an inspecting deputation—evidently to see that all the requirements of the central public authority for the Metropolis had been duly complied with. With them were Mr. Goodenough and Mr. H. Austen Hall, F.R.I.B.A., of Messrs. Warwick and Hall, the Consulting Architects. The latter had been punctilious in seeing that the suggestions of the County Council were carried out; so that the members of the deputation, we have no doubt, were abundantly satisfied. The County Council are very particular about exercising their statutory rights in regard to all buildings in which the public assemble in London.

In the making of the exhibition, some 2½ miles of mains were laid; and the total length of piping (large and small) used for all purposes for the supply of light, heat, and power was approximately 25 miles. In the erection of the model dwellings and demonstration rooms, &c., 15,000 square yards of new plaster work were put in. One morning paper stated that 7000 workmen were employed for a month in connection with the building and fitting-up of the exhibition. We fancy 700 is a number nearer the mark.

It is common talk that there are gas-supply districts not far from London where there is not a single exhibition poster to be seen on the hoardings, and the inhabitants of which districts have not received a single circular from the gas suppliers in regard to it, to say nothing of admission tickets. Perhaps what we think had better not be written; certainly we cannot report what other people are saying in regard to certain non-supporters. A couple of tickets are on the desk at home, by which the Directors of the South Metropolitan Gas Company extend "a cordial invitation" to visit the exhibition. It is accepted with thanks. The tickets are being passed on to others who have not "seasons," and are without invitations. This is all in the good of the cause. The invitation (the South Metropolitan one is only mentioned because it touches us in private capacity) is as things should be in every gas-supply area within fairly easy reach of London. Farther afield, special efforts should be made to get representative people to the exhibition.

From a suggestion in an article in the "JOURNAL" at the time of the Earl's Court Gas Exhibition in 1904, there sprang into being, activity, and usefulness the Society of British Gas Industries. Under the roof of the National Gas Exhibition, there are represented the Institution of Gas Engineers, the Society of British Gas Industries, the British Commercial Gas Association, and the Sulphate of Ammonia Committee. Separate bodies all working for one object—industrial progress.

In connection with the luncheon at the opening of the Exhibi-

tion, it may be useful just to emphasize the fact that those identified with the gas industry who were present paid for their tickets. Any not present, and who may have overlooked the resolution referring to the matter of payment, will find it mentioned in the report of the Executive ["JOURNAL," Sept. 23, p. 826]. The Committee considered payment the proper course, "as strong criticism might well be directed against the administrators of the funds of the exhibition which have been subscribed to so largely by the gas undertakings of the country, if the money so subscribed for the benefit of the industry were spent upon the entertainment of those connected with it. Especially would criticism come from those who, having subscribed to the exhibition funds, were prevented by circumstances from taking part in its functions."

The brilliant display of the high-pressure lamps outside the exhibition is disturbing the even tenour of the ways of the Uxbridge Road. Nightly, at all hours, large crowds are seen gazing at them. They make a remarkably fine show; and the demeanour of the clusters of high-power electric metallic filaments on high standards in the neighbourhood appears to be somewhat apologetic.

When the visitor has exhausted the delights of the first three or four halls, and then gets to the corridors running alongside the tea room, lecture room, cookery demonstration room, restaurant, reception room, and banqueting hall, he must not turn back. Beyond these corridors is the hall fitted up with street-lamps of all descriptions. This was the most backward part of the exhibition. But there is much that is worth inspection there to-day, in the way of low and high power lamps, distance controllers, and other useful apparatus required on the district.

Regarding the reference to the backwardness of the street-lighting section, the exhibition is a multi-sided one; and the organizers could well have been forgiven for the fact that there was still work the first two or three days that needed attention to give perfection. That there was this to be done is due to the organizers being the victims of circumstances. The labour world is just now in a very sensitive mood, so sensitive that on almost any job in the building line—save among gas men—the most trivial thing is made an excuse for agreeing to "down tools." The building of the exhibition was accompanied by quite a series of strikes among the builders' men. If a fitter's boy made good a hole in the plaster through which a gas-pipe had been run, that was sufficient for a cessation of work by the plasterers. At the meeting of the Southern Association on Thursday, Mr. Goodenough stated that some days the men struck almost as many times as the clock—at any rate, there was one day on which they struck five times. Combined with this, there was trouble with the transmission of goods by rail; and there was a terrible job in sorting out the goods when they did arrive, through some makers disregarding the labels that were sent out to assist in discrimination and location. However, it is all over now. Here is the finished exhibition; and may its success exceed anything that has ever gone before in the same line.

Professor Vivian B. Lewes quickly had his audience in a good humour at his first lecture. Bailie Paxton, the Convener of the Glasgow Corporation Gas Department, as Chairman of the meeting, had taken about a quarter-of-an-hour in introducing Professor Lewes, and perhaps the following anecdote, with which the lecturer led off, was intended as a quiet "dig." He said the celebrated lecturer, Dr. Andrew Wilson, who had the reputation of being a bit fiery, was down to lecture at Newcastle-on-Tyne. The Chairman of the meeting took three-quarters of an hour in introducing the lecturer, and finally concluded by saying: "Dr. Wilson will now deliver his address." Dr. Wilson strode up to the reading-desk, and, thumping his fist upon it, shouted "My address is No. 42, Heriot Row, Edinburgh, and I am now going there." Needless to say, the lecture was never delivered. History did not repeat itself in the case of Professor Lewes, however, who held the interest of a large audience to the very end, in the manner that only he himself can do.

The attendance of the general public at the exhibition on Saturday was large—especially in the evening. Everywhere interest was at high-water mark; and the attendants—willing and courteous—were kept very busy.

On ordinary nights at the exhibition it would be well if in some way visitors had their attention prominently directed to the cookery demonstrations and popular lectures, and the hours at which they invite attendance. The exhibition is so large, and there is so much of interest in it, that on ordinary days and nights the demonstrations and lectures are likely to suffer if there is not a little more publicity given to them. They were both full-up on Saturday; and so were the seats round the band-stand.

A notable guest at the luncheon on the opening day was Mr. W. Duddell, F.R.S., the President of the Institution of Electrical Engineers. More of a scientist than a commercial man, he was no doubt able to view the great strides which are being made in the gas industry with greater equanimity than other electrical engineers who have been paying visits to see how the land lies.

The attendants quickly found themselves busy on the opening day. The exhibition was not thrown open to the public until two p.m., yet within an hour and a half addresses were being taken to which further particulars of gas-stoves were to be sent—and this was before the Lord Mayor had left the building.

Mr. James Parker, of Coalite fame, was having a quiet look round on Thursday evening.

In the course of the Cookery Conference on Saturday, Mr. Goodenough said that many people in the North save up their heaviest pennies for the prepayment meters in the belief that the heavier the penny the greater the quantity of gas obtained for it.

The hopes of one attendant went up with a bound on Saturday when he had an inquiry from an architect who is laying out a very large estate with £500 houses, which he desired to equip with complete up-to-date gas outfits. He had come to the exhibition specially for the purpose.

The exhibition is an excellent educational place for the employees of gas undertakings; and directors and committees should therefore give their people special facilities for paying a visit. Various gas undertakings, it is understood, have not only supplied their employees with tickets of admission, but have also made an allowance for the expenses of any employee desiring to avail himself of the privilege, and signing an application form. The Croydon Gas Company may be taken as an example. Half-a-crown will cover the travelling expenses of a man from Croydon; and the Directors are handing over this sum, with the admission ticket, to anyone filling in the application form, which has to be initialled by the chief of the employees' department. It is also noticed that two prizes, each of a guinea, have been granted by the Directors for awards to the writers of the best two essays describing what was seen at the exhibition, and how it could be made use of to further the development of the Company's business. The essays are not to exceed 1000 words in length. The suggestion is worthy of wide adoption.

Shortage of pennies in slot-meter households frequently results in two-shilling pieces being used. The Gaslight and Coke Company are frequently receiving post-cards that two-shilling pieces have been put in, and sometimes the request is that the difference should be refunded at once—the financial position of the consumer not permitting of waiting until the next collection. Incidentally, the receipt of these post-cards has revealed the spelling of "meter" in eighteen different ways.

Miss Constance Williams's lecture on "The Silent Servant" on Friday was, in a way, a delightful piece of autobiography, for it recounted her own life and its change from the coal to the gas age. And the coal age nearly resulted in a tragedy. Miss Williams and two friends rented a country cottage, one of the chief worries of which was whether one or other of the trio had filled the boiler. Oblivious of the fact that one of her companions was not alone in the garden, Miss Williams one day called out to her, "Have you filled the boiler?" It so happened the worthy vicar was at the moment on the point of proposing that Miss Williams's friend should become "Mrs. Vicar;" but the sound of the voice from the house so unnerved the good man that his courage left him, and, unfortunately for the lady, it never returned. Miss Williams philosophizes that if gas-stoves had been in existence she would not now be under the reproach of having prevented her dear friend from securing a husband. Miss Williams, by the way, is a well-known lecturer on the political platform. Miss Williams's final words were: "A good gas-cooker is as important as a good, kind husband."

Mr. Edward Allen took the chair at Miss Williams's lecture on Friday; and although the attendance was good, he apologized for the comparative smallness of it—having in mind, no doubt, the large attendance on the previous evening, when Professor Vivian Lewes lectured. Miss Williams, however, counterbalanced the apology by recalling a political meeting which she addressed in Dorsetshire, and which consisted of seven old ladies, one of whom was stone deaf. In addition, they had all been promised tea if they remained until the end of the lecture. Both these facts were discovered after the lecture.

During the run of the exhibition, the "JOURNAL" will be on sale at the bookstalls of Messrs. W. H. Smith and Sons in the galleries.

By inadvertence in "making-up" last week's "JOURNAL," the reference to the "O-Sho" boiler was transposed to p. 915. It should have come under the notice of the Phœnix Supply Company's exhibit on the following page—this Company being the exhibitors.

SOME NOTES ON FURTHER EXHIBITS.

In addition to the notices of exhibits published last week, the following ones have to be given:

Liverpool United Gaslight Company's Exhibit.

Testing Gas-Meters.

In the Industrial Hall, in conjunction with the meter-stand, there is a fine exhibit of meter-testing apparatus. To this the Liverpool Gas Company made contribution; and they are justly proud of the apparatus. Their notes on the subject are as follows:

Gas-meters are adjusted for correct measurement, for tightness, and for free working at a low pressure. The adjustment for correct measurement consists in comparing the index of a meter with a standard measure; the standard being 1 cubic foot as denoted by 1 cubic foot of water at 62° Fahr., which weighs 62·321 lbs. This standard was used by the late Mr. Alfred King in the construction of the cubic foot measure and a cubic foot test-holder (fig. 1).

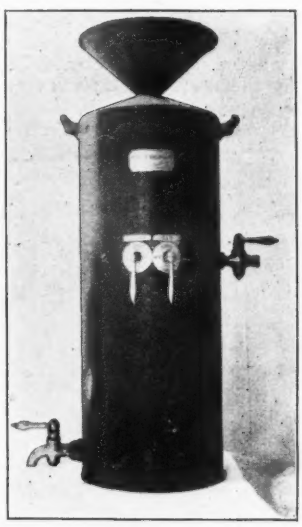


Fig. 1.

With the aid of the cubic foot measure, the test-holder, having a capacity of 4 cubic feet, was constructed; and this has been in daily use in the testing-rooms of the Liverpool United Gas Company for over sixty years (fig. 2). It will be noted that the scale is attached to a pulley-wheel, and is remarkably easy to read. The top of the holder is not domed, but flat; the intention

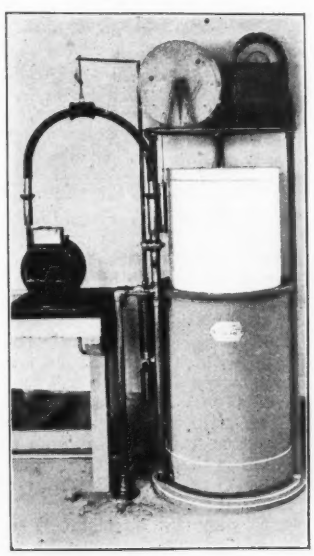


Fig. 2.

being that additional weight, if necessary, could be added, and so vary the pressure in the holder. The holder is perfectly balanced by a compensating weight, so arranged that, as the holder rises or falls in the water, the leverage of the weight is moved away from, or nearer to, the centre of the axle; and thus corrects the error occasioned by the immersion of the holder.

A simple and ingenious water-seal cup and spigot takes the place of the more modern putty joint between the holder and the meter to be adjusted. Mr. King's original design of pressure-gauge is still in use. This instrument is well known, and has become the universal gauge for obtaining magnified readings of the pressure.

Dry meters are tested for tightness by expelling the air, and filling up with gas at a pressure of 12 inches (fig. 3). Gas is necessary so that, if a leak be present, it may be found by the application to the casing of a lighted torch, when the high pressure of

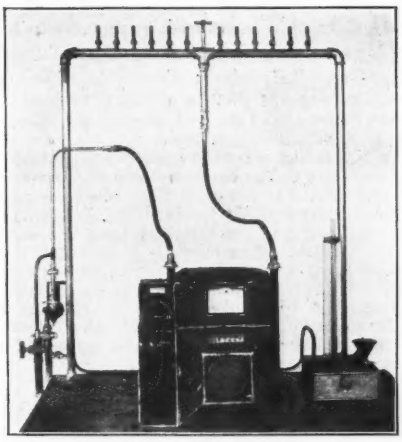


Fig. 3.

gas will spurt out in a flame. Before the meter is removed from this bench, all the gas is expelled by the introduction of air; thus preventing any possibility of explosion occurring during any subsequent operations.

Wet meters are subject to a much higher pressure—5 lbs. per square inch. This is advisable on account of water, necessary for the working of the meter, which will naturally indicate any weakness in the workmanship (fig. 4). The pressure is obtained by means of a head of water 10 feet high; a tube is connected to

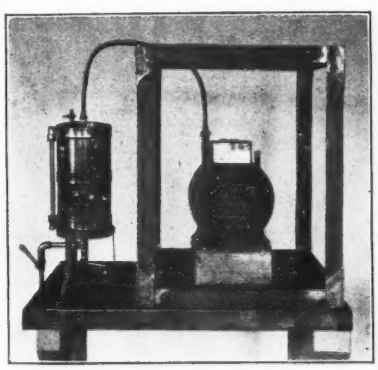


Fig. 4.

the meter, which is then immersed in a tank of water; and any leak which may be present is at once observed by the stream of air bubbles arising from it. Meters are tested for easy and free working by the removal of weight from the holder, which has the effect of reducing the pressure.

Whessoe Foundry Company.

This Company are showing a number of photographs illustrating the following: (1) The three-lift holder (capacity 6,000,000 cubic feet), erected at the St. Anthony works of the Newcastle and Gateshead Gas Company. (2) A three-lift holder (capacity 1,000,000 cubic feet) for the Tokio Gas Company. (3) Four dry-seal purifiers, 40 ft. 10½ in. by 34 ft. 1½ in. by 5 ft. 1¼ in. deep, in steel building, erected at the Birkenhead Corporation Gas-Works. (4) Stage-floor purifier-house containing six purifiers, 25 feet square by 5 feet deep, erected at Nanterre, near Paris, for L'Union des Gaz. (5) A "Whessoe" twin rotary washer-scrubber, of a combined capacity of 3,000,000 cubic feet per day, for the Walker and Wallsend Gas Company. (6) A 12 feet diameter riveted steel pipe for the Newport (Mon.) Docks. (7) Four 500-ton coal storage bunkers, erected at the Auckland Park Colliery, Durham. (8) A 1000-ton coal-storage plant, erected at Lambton Colliery. (9) A large photograph of the oil depôt for the British Petroleum Company, Beckton, comprising eleven tanks, with a total measured capacity of 11,203,338 gallons.

Thomas Piggott and Co., Limited.

This Company are showing photographs illustrating their various manufactures, among them gasholders (which they have supplied and erected in various parts), as well as large diameter steel gas-mains. The models include a 42-inch diameter steel bridge main, one of a steel breeches pipe, 7 ft. 10½ in. to 3 ft. diameter, and one of a patent pressed steel tank on a model tower, of which a large number are being supplied at home and abroad.

VISIT OF THE SOUTHERN ASSOCIATION TO THE EXHIBITION.

The members of the Southern District Association of Gas Engineers and Managers paid an official visit to the exhibition last Friday. There was one regret, and that was that the President (Mr. H. O. Carr, of Wandsworth) was unable to be present. He explained his absence in the following letter addressed to the Hon. Secretary (Mr. W. E. Price):

> Much to my regret, I shall be unable to be present on Friday, as I must attend the trial of our new collier, s.s. *Mitcham* at Newcastle on that day.
>
> I wish I could have been present to rejoice with my brother engineers at the latest evolutions of our art so admirably displayed at the great Gas Exhibition, and to thank Mr. Goodenough for sparing some of his valuable time in expounding to our members some of the good things which should not be missed. Moreover, to thank him for his great participation in preparing the exhibition, which will surely create in the members' minds a lasting monument to his fame. I wish also to thank Mr. Glover for so kindly presiding; and last but not least to join in the general good wishes for the success of the exhibition. *May the public come in their thousands.*

With two or three guests, there were probably about sixty members present from all parts of the large district. Before they commenced their inspection of the vast display, they lunched together in the reception room, which made an admirable place for the purpose.

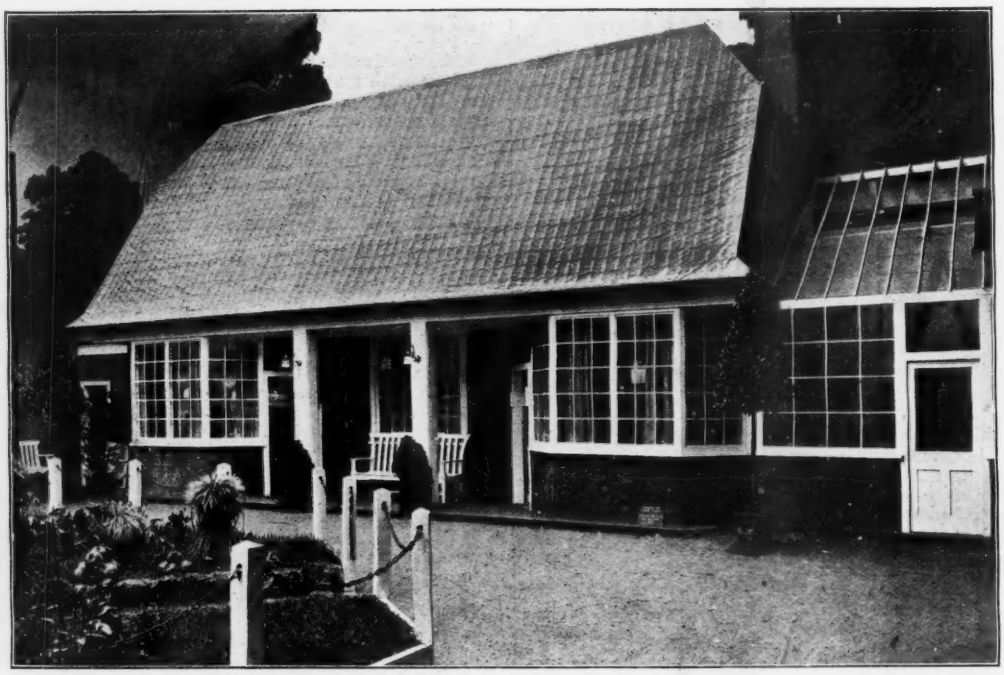
The Vice-President (Mr. Thomas Glover, of Norwich) occupied the chair; and on his right-hand side was the President of the Institution of Gas Engineers (Mr. Edward Allen), and on his left-hand side Mr. F. W. Goodenough. The Hon. Secretary of the Exhibition (Mr. Walter T. Dunn) and the Organizing Manager (Mr. F. W. Bridges) were also present.

After luncheon,

The Hon. Secretary (Mr. W. E. Price) mentioned that he had received several letters of regret, among them one from the President of the Exhibition (Sir Corbet Woodall, D.Sc.). The body of Sir Corbet's letter was as follows:

> I received your circular note with regard to the visit of the Southern District Association to the exhibition of the 3rd prox. with very much pleasure. I think it will be the duty of each of us to do all in our power to bring other individuals or societies to the exhibition so as to make its value more generally known.
>
> As you know, I shall have a pretty full day there on the 1st; and I fear therefore that it will not be possible for me to attend again on the 3rd.

The Hon. Secretary added that Sir Corbet did his duty on the opening day, as they all knew he would; and very well he did it.



THE COUNTRY COTTAGE.

THE PRESIDENT OF THE INSTITUTION.

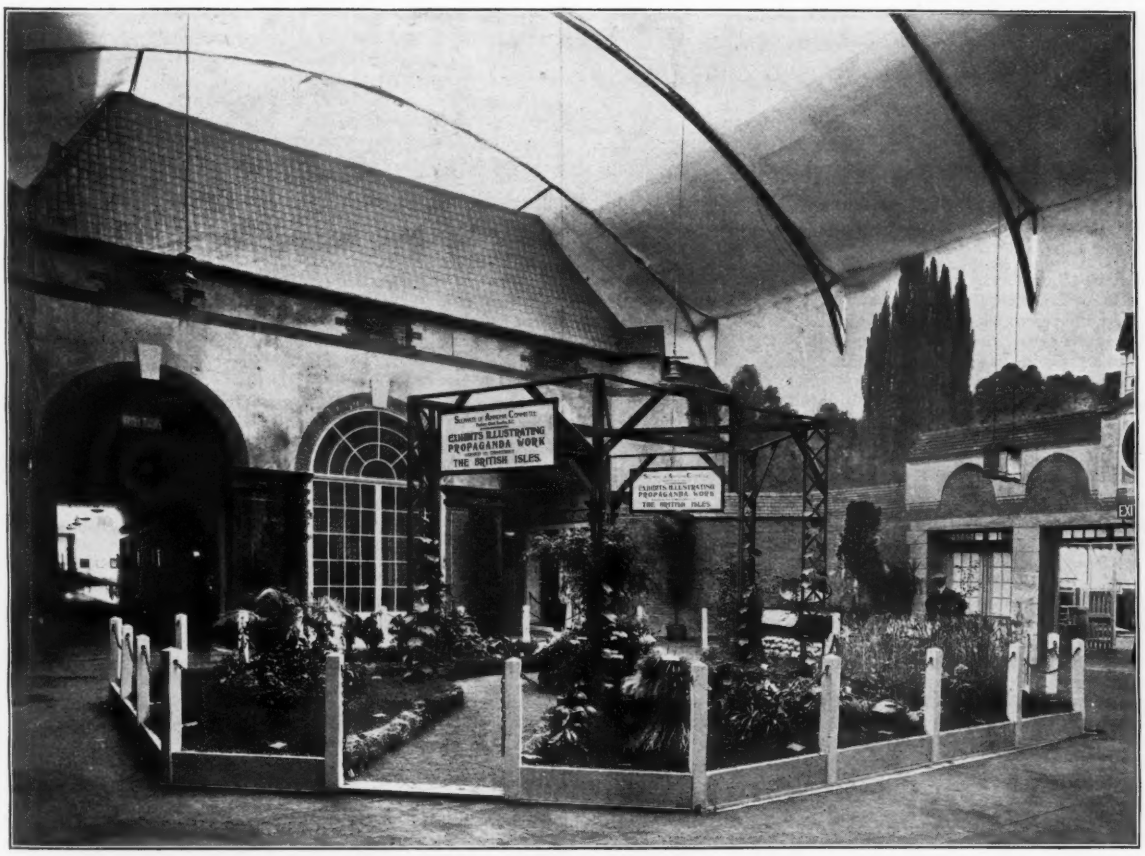
The CHAIRMAN said they were honoured on this occasion by the presence of some distinguished gentlemen. They had with them the President of the Institution of Gas Engineers and of the British Commercial Gas Association. They were very proud to have Mr. Allen with them on this historic occasion. It was historic because they were assembled at the Jubilee Exhibition of the Institution and the Centenary Exhibition of public gas supply. The exhibition was representative of the whole gas industry of the United Kingdom; and they all hoped that the conclusion of all who visited it, both engineers and their consumers, would be that it was a worthy representation of the industry, and of its power to serve the public with all that they required in respect of light, heat, and power. They often felt—in fact, they saw—that the times were changing. They certainly had changed very greatly with regard to what gas suppliers were called upon to provide. They had also changed in regard to the way in which the gas industry went about its commercial work. No longer did they expect consumers to come and beg and pray for a supply of gas, but the gas companies went to them, and "compelled them to come in." The exhibition was one of the signs of the times. Mr. Allen was one of the most enterprising of their modern engineers. Any one who had had the pleasure of visiting him in his own city would know that he had a most enterprising outdoor staff, who were meeting the needs of the people of Liverpool in an excellent way. It was Mr. Allen's wish that his staff should take a foremost place in supplying gas in all its new uses. They were very proud to have him there; and he (Mr. Glover) would ask those present to drink to his health, and express the wish that his year of office would be a successful and happy one in every way.

Mr. ALLEN said he was very much honoured by the way in which Mr. Glover had referred to him. They were very old friends. When Mr. Glover was a younger man than now (though he was still a young man) he used to see more of him, because, though there were splendid gas-works at St. Helens, there were some things at Liverpool which interested Mr. Glover. He then occasionally went over to see what they had to show him; and personally he (Mr. Allen) gained information in consequence of these visits. The friendship had continued; and he hoped it would continue as long as they were allowed to dwell on this mortal sphere. He had to thank their Chairman for his kind reference to his (Mr. Allen's) position as President of the Institution of Gas Engineers and of the British Commercial Gas Association. He ought, perhaps, to value the dual office the more, because this was, in all likelihood, the last year in which the same individual would bear the two titles. They were quite sure it should be the last year that the dual office should exist; they were quite certain that the time had come when some of the able men who represented the industry as chairmen of gas committees and as chairmen of gas company directorates should receive some of the honour in connection with the British Commercial Gas Association. It was intended that on the 22nd of October the change should take place, and that the rules of the British Commercial Gas Association should therefrom be altered, so that the members might be able to elect some one of these able men to occupy the position of President. This would be to the strength of the Association; it would be for the benefit of their

great industry. He felt also that being President of the Institution in the year this great exhibition was being held was very notable; and he should look back in years to come (if he was spared) with a great deal of pride and pleasure to the fact that he had had connection with the great exhibition. He would like to take this opportunity of expressing his appreciation of the labours of the Chairman of the Executive Committee in connection with the exhibition. To all who had been associated with Mr. Goodenough in this matter, it had been a great education; and they would all profit by it. The present unique exhibition he (the President) was sure was only one of a succession of exhibitions that would show to the world what a live business was the gas industry, and how much the world was receiving from its operations. Before sitting down, he should like to express the good feelings he had towards his fellow members of the Southern Association. It might not be known to them all that he was a member of it. He had not the opportunity of being with them on every occasion of their meetings; but when one did occur, he certainly should take advantage of it. That morning he had shaken hands with a number of his friends; and now he was glad to stand before them all, and figuratively shake hands with every member. In this Association they had a true representation of gas engineers and managers who did so much to make the industry successful, and to enable it to be respected. He thanked them for the honour done him in asking him to propose the health of Mr. Goodenough, and this he did with very great pleasure.

The Change in the Presidency of the B.C.G.A.

Mr. Goodenough, in responding, thanked Mr. Allen for the kind way in which he had referred to him personally, and for the much too much credit that he had laid upon him (the speaker) in connection with the exhibition. It was true that he had had a good deal of work to do for it; but the exhibition was the fruit of the labours of the Executive Committee. He wished to take this opportunity—it was the first he had had of speaking since this exhibition opened—of expressing very strongly his feeling that it would be in every way wrong for it to go forth that he alone was responsible for the exhibition, and that no credit was due to the Executive Committee as a whole. The Committee had met often, and had sat long; and the result of their deliberations had been what the members of the Association were there to see. There was no question whatever of this being a one-man Committee. It had been a happy and a hard-working Committee; and his friend Mr. Bridges, who had had a great share in the work that had been done, would bear him out in saying that every member had been a keen and eager worker in the cause. It was just owing to the accident of his being Chairman of the Committee that he had been brought a little into prominence. But any of the members



THE EXHIBIT OF PRODUCE BY THE SULPHATE OF AMMONIA COMMITTEE, WITH THE CONSERVATORY OF THE TOWN HOUSE IN THE REAR.

could have done what he had done had they had the opportunity. ["No, no."] However, he did not think it fair that he should be singled out, because, as he had said, it was only the accident of his position that enabled him to do a little more work than some of the others. There had, of course, to be a man to handle details when a Committee consisted of men from all over the country. To pass from the personal aspect, which was never one he was keen to dwell upon, he had to express the regret of the Committee that the Association should be there that day to find the exhibition in some respects incomplete. It was their ambition that it should be ready by the morning of the opening. There was one thing that they did achieve, and that was to get the catalogue out two days before the opening; and very much credit was due to the Editor for the expedition shown in this matter. The fault of the exhibition not being complete in all details did not lie at the doors of the organizers. They would realize this when he told them that the contractors' men struck almost as often as the clock. They had five strikes in one day, but not a single one among the gas-fitters. No man, in fact, in connection with the gas industry put down his tools. But the painters, and the decorators, and the plasterers played up and down with their tools most of the time. There were several strikes because they had lads who filled in perhaps 2 or 3 square inches of plaster where it had been broken away in running through the fittings; and the plasterers went out on strike every time any of the gas-fitters were known to fill in with plaster. Then there were railway troubles; and fittings and appliances seemed to have gone a regular tour round the country before they reached Shepherd's Bush. [Mr. Goodenough then described the principal features in the scheme of the exhibition.] Subsequently, he said Mr. Glover had referred to the fact that the times had changed. The exhibition was an example of that. In no way was it better shown than by the spirit of the manufacturers who had co-operated in the exhibition. One and all had shown an extraordinary readiness to meet each other, and to make the exhibition a success without regard for their personal interests. In no case had there been anything but the most co-operative spirit in building up the exhibition. He hoped this was only the forerunner of much co-operation in the industry in future. He also wished to allude to what Mr. Allen had said concerning the presidency of the British Commercial Gas Association. It was due to Mr. Allen's own self-sacrificing action that his presidency of the Association would only have lasted about four months, because, at the meeting of the Association to be held this month, Mr. Allen was himself bringing forward the resolution which would alter the rule which provided that the President of the Institution should also be President of the Association. The alteration of the rule would give them power to elect the Presidents of the Association from among the Vice-Presidents, which would enable

chairmen of gas committees and of gas companies to be elected. The General Committee at once realized the value of the change to the Association; and they were nominating Bailie Paxton, the Convener of the Glasgow Corporation Gas Committee, to be first President under the new rule. They all very much appreciated the action of Mr. Allen in this matter; it was truly characteristic of him.

The CHAIRMAN said he was proud to have been their Chairman that day; but he was very sorry their President could not be with them. However, he (Mr. Glover) had been glad to fill the gap which was created by his unavoidable absence. He was quite sure that Mr. Carr was thinking about them at that time, and very sorry that his duties prevented him being present. Looking round the table, they were glad to see Past-Presidents and other friends with them that day. It was indeed a very pleasant gathering. They were the first Association, as an Association, to visit the exhibition; and many of them would be pleased to come again. They had to thank the Hon. Secretary for arranging the visit for them; and they must drink to his health.

Mr. PRICE thanked the members for their acknowledgment; and, on his proposition, a hearty vote of thanks was passed to the Vice-President for having occupied the chair.

Subsequently the members followed their own inclinations as to how they inspected the exhibition; and late in the evening several were still to be seen wandering round the picturesque place, intent on making a most minute investigation.

CONFERENCE ON FOOD AND COOKERY.

THE first of the conferences arranged in connection with the exhibition was held on Saturday, and dealt with questions relating to food and cookery. Mrs. W. N. SHAW presided; and there was a good attendance of the general public. During the proceedings, there was an adjournment for tea, at the invitation of the Executive Committee.

Mr. F. W. GOODENOUGH (the Chairman of the Executive Committee), in a few preliminary remarks, pointed out that the subject of the conference was a very broad one, and touched the lives and interests of every man, woman, and child throughout the country. It was a subject which was quite appropriate to a Gas Congress, as gas played a very large and constantly increasing part in the kitchen economy of the country; but the promoters of the Congress did not desire that the consideration of the question should be confined only, or even mainly, to the question of cooking by gas. The gas industry, however, recognized that gas being the future fuel of the working classes, as well as of the more well to do, they could perform a real service to the community by assisting in the much-needed work of improving the quality of the food from which the masses of the people derive their vitality and strength. And it was believed that, as the opportunity was in the hands of the gas industry, it was their duty, as servants of the public entrusted with the monopoly of the supply of gas in their district, to see that everything within their power was done to ensure that the gas supplied was consumed in efficient appliances, so that the working man and his family might get the greatest value from the penny spent, and to see that instruction was given to the housewife in the economical and correct utilization of the fuel purchased. It might be said that the gas industry, in taking an active part in promoting improved methods of cooking, were going outside their natural sphere, and that it was their duty only to sell at a reasonable price a good-quality gas; but those who had charge of the policy of the industry believed that this would be taking a short-sighted view of the matter, even from a business aspect, and that from a higher standpoint it would be a failure to administer the trust given to them by Parliament, both under their General Acts and under the Special Acts governing the use of the prepayment meter. It would be a failure of trust in the sense that, unless every step was taken to ensure the maximum usage of gas in the district of any undertaking, this undertaking would be unable to supply gas as cheaply as it could were the demand greater; it would also be a failure of trust in another sense if, being the only supplier of a particular form of fuel, the undertaking did not take steps to see that all its consumers—and particularly the poorest—were advised of the most economical means of using this fuel. Here, again, as throughout all business life, ethical policy coincided with sound business policy, as it was upon the satisfaction of the consumer that the ultimate prosperity of any enterprise depended. It was with this object in view that the Committee had called together this conference, and had asked Dr. Priestley to deal with the subject from the point of view of the health-value of good cooking, and of the considerations to be observed in cooking to ensure good health; Mr. Herman Senn to speak upon the subject of how the working man's wife can best spend her money in obtaining and preparing food for her husband's table; Miss Mildred Atkinson to speak on the question of how the rising generation can best be instructed in the art of cookery through the schools; and Mrs. M'Killop to deal with the value of the prepayment meter (the use of which had grown with such astonishing rapidity in recent times) as an item of equipment in the working man's home. The value of the papers would not be confined to their delivery before the conference. They were to be subsequently printed and circulated throughout the country among those most interested in these aspects of national economy.

COOKERY IN ITS RELATION TO HEALTH.

Dr. J. PRIESTLEY (who is Medical Officer of Health for the Borough of Lambeth) said the improvement which had been effected in cooking by gas had been considerable; and that the daily use of over three-quarters of a million gas fires and stoves must be having a marked effect upon the health of the inhabitants of the Metropolis. Among the improvements mentioned were the oval ventilating flue-outlet; the wide fire-grate and the absence of front bars; the use of non-conducting material for packing the sides and backs of grates and ovens, so as to obtain the full advantage of the heat used; the porcelain enamelled linings of cooking-stoves; and the heat distributors, hot plates, steam-jacketed pans, double-cased roasting-ovens, steam-heated vegetable and pudding steamers, fish and potato fryers, grillers and toasters, *bains-maries*, confectionery and pastry ovens (with outside heat), steam-tight doors, carving-tables, hot-closets, and many other advances in design. The net result was a gas fire or stove of scientific principle and design, giving efficiency with economy, though naturally this latter had not been, from a financial point of view, as marked as the former. Nor was it to be expected. The present price of coal, the cost of the necessary treatment and preparation to make gas, and the upward trend of labour remuneration (both scientific and manual) all went to keep up the price of gas as fuel, so as to render its universal use, at present, somewhat of an ideal. The financial economy of the gas-fire over the coal-fire, however, was in the fact that the gas could be turned off and on as required; while there were economies other than financial ones in the saving of labour in the carrying of coals and ashes, and in the minimizing, or even the prevention, of dirt and dust and smoke. As emphasizing the advance in scientific principle and design of the gas cooking-stove, reference was made to the "Lancet" report on cooking by gas in 1907, when the question was raised as to whether or not gas cooking was injurious to meat. The answer was in the negative; but it was at that time the answer of the expert. To-day, however, both layman and expert agreed that there is, in actual practice, no such danger as was, at one time, anticipated, and that, as a fact, gaseous products from the gas fumes are not absorbed by the cooking meat. Even assuming that these products of combustion might prove a danger, it must be remembered that the newest designs of stoves get over even this problematical difficulty by ventilation, or by keeping the fumes of the gas outside the stove. The "Lancet" report of 1907 was a comparison between open coal-fire roasting and closed gas-fire roasting. If the conditions be the same—open or closed cooking in either form—the results were the same; and as the "Lancet" comparison under the different conditions was satisfactory, it was clear that gas cooking in any form was satisfactory from the effect upon the meat, while it had the additional advantages over a coal-fire already pointed out. In his opinion, the only drawback to the general use of the gas-cooker was the expense of the gas.

Nevertheless, a revolution in cookery was being brought about by the introduction into more general use of the gas-cooker, the ideals of which should be: (1) Simplicity of design; (2) economy in fuel used; (3) prolonged action of moderate heat, uniformly applied and regulated with equable distribution; (4) provision for open roasting before a gas-fire; (5) abolition of dust and dirt and smoke; (6) ready means to hand for emergency cooking—*e.g.*, early breakfasts and late suppers, in times of sickness, during the night, &c. These ideals were not attainable with the ordinary open coal-fire; and what was necessary, was to reduce the present cost of gas, or to introduce stoves that would burn a minimum amount of gas, if gas fires and cookers were to become more popular than at present, and to be within the range of every working man. Everything now depended upon the financial aspect of the case; for the improvements in design that had been made in the past encouraged one to look forward to the future without misgivings, and the day was not far off when the ideal would be reached. The simpler the cooker the better. In this connection, he drew special attention to the new demonstrating gas-stove used at the recent course of lectures at the Society of Medical Officers of Health, and which was now on view in the show-rooms of the Gaslight and Coke Company. It was, said Dr. Priestley, an endeavour to achieve the ideals which he had laid down. The simplicity in design was best shown by the fact that the stove itself consisted of six parts only, with hangers and spits in addition, for suspending purposes, and an enamelled tray for the cooker to stand on. There was one horizontal burner, the flames from which impinged upon a sheet of asbestos, thereby providing sufficient heat to roast two joints, or a joint and a fowl, at the same time, simultaneously with boiling, frying, and baking operations. Everything was open to the air, and all cooking operations were visible while they were being carried on. All the pieces of which the cooker was composed could be separated and boiled in strong soda and water. Screens were also provided to prevent draughts. The material of which the stove was constructed was welded steel, with a lining of tin round the asbestos sheet. He recently prepared a dinner by this new gas-cooker, all the dishes being cooked at one and the same time. They consisted of soup, white sole, roast loin of lamb, roast fowl, an entrée of kidneys (*en* casserole), steaming of two vegetables (potatoes and beans), baked sausages, and a custard. All this cooking was done at one end of a table, while the guests partook of their luncheon at the other. There was no smell or inconvenience from the fact that the cooking was carried on in the same room. The supply of gas was through a special meter, which registered 15 cubic feet per hour; and as the

cooking operations took roughly two hours, the expense of the fuel used might be, without exaggeration, put down as 1d. The ledge over the asbestos sheet, upon which the casserole cooking could be carried on, was worthy of note, as the heat from the fire could not break the casserole pots, owing to the fact that the flames did not actually touch them. The weight of the stove was 6 lbs., or including the earthenware tray and screens 15 lbs.

In conclusion, Dr. Priestley emphasized the point that the proper preparation and cooking of food are important to the nation's well being. Common-sense cookery was wanted, and the introduction of gas cooking made the teaching of this in schools and educational centres an easy task.

There was no discussion upon the paper.

The Cookery Class in its Relation to the Home.

Miss Mildred Atkinson, B.Sc., then read a paper on this subject, in the course of which she explained how to improve the working man's table, through the working man's child, and thereby raise the standard of national health and physique. She pointed out the various advantages possessed by a gas-cooker over a coal-fire.

The Penny-in-the-Slot Meter as the Working Man's Friend.

Mrs. Margaret M'Killop read a paper in which she confined her attention to the use of cookers with automatic regulators, postponing the remainder of the subject to a later paper which she will give on "Fuel and Light in the Working Man's Home." Dealing with the various types of cooker sent out on hire, she deprecated the hiring of stoves without enamelled linings, as the plain iron stoves offered no inducement to cleanliness. Frequently, gas companies had stoves returned in a disgustingly dirty state; and perhaps this might be overcome by always hiring enamelled stoves, and by varying the rebate, often allowed, according to the cleanliness of the stoves when the money was collected for the prepayment meters. Simmering burners and small boiling-burners should be fitted to such stoves more frequently than was now the case; while if gas companies would also have a selection of pots and pans available at something like cost price, it would be a good thing. Statistics showed that from 8d. to 1s. per week was spent by slot-meter consumers where the weekly income was from 25s. to 30s., which might be divided into an expenditure of 1d. per day and 2d. on Sunday, and 1½d. and 3d. respectively. In discussing means for getting the greatest value from a pennyworth of gas, the advantages of double-saucepan cooking was emphasized, as was also the expedient of having a cooker with a special slot-meter for a month or so, in order to ascertain exactly what could be done for one penny.

Mr. Shaw suggested it would be a convenience if some attachment could be fitted to prepayment meters which would indicate that the pennyworth of gas was nearly expended in order to avoid the gas going out during cooking operations.

ONE OF THE TWO CORRIDORS RUNNING THROUGH THE TOWN HOUSE.

[The Semi-Indirect Lighting will be observed, as well as the Billiard Room on the left-hand side.]

Mr. Goodenough said there was now such a device on meters; but it was not very sensitive. As to the suggestion that the bonus should depend upon the collector's idea of the cleanliness of the cooker, he was afraid it would mean changing the collector every time, as it was doubtful whether the housewife's opinion on the point would be the same as that of the collector's. Gas companies would be quite prepared to sell efficient utensils at cost price, if a demand were created. The figures of weekly expenditure given by Mrs. M'Killop were singularly well borne out by the average consumption of penny-in-the-slot consumers. The value of the gas-cooker for bread-making should be impressed upon the working classes, who ought to bake their own bread in the South as much as was done in the North.

Planning, Buying, and Cooking for the Working Man's Table.

The last paper before the Conference was by Mr. Herman Senn, who, however, was unable to be present. The notes left by him were read to the meeting by Mr. Goodenough; and arrangements have been made for Mr. Senn to give his paper in a more extended lecture form on some other occasion during the run of the exhibition. At present Mr. Senn is carrying out experiments with modern gas cooking, and has ascertained an economy in one family of 1s. 1d., and in a second family of 1s. 4d., per week compared with the previous methods adopted.

POPULAR LECTURES.

THE EVOLUTION OF GAS LIGHTING AND HEATING.

By Professor Vivian B. Lewes, F.I.C., F.C.S.

Professor Lewes delivered the first of his three lectures on this subject on Thursday last. The chair was taken by Bailie T. Paxton, the Senior Magistrate for Glasgow, and also representative of the Glasgow Corporation Gas Department. The hall was well filled with the general public, and among those present were Mr. F. W. Goodenough (the Chairman of the Executive Committee of the Exhibition), Mr. H. M. Thornton, J.P. (the Vice-Chairman of the Executive Committee), and Mr. John Bond (the Vice-President of the Institution of Gas Engineers).

In introducing the lecturer, Bailie Paxton said that the present was a very important time in the history of the gas industry. This exhibition was the largest, the most important, and the most instructive and educative that could possibly be brought together; and it had been very gratifying to find so many municipal representatives had travelled long distances to attend the opening function on the previous day. The reason for this was, he believed, that the time had come when one and all responsible municipal representatives believed they were up-against something that would early require dealing with—namely, the purification of the

air of our cities. In Glasgow, in the early fifties, there was an outbreak of typhoid of very serious dimensions, and a great deal of money had to be spent before the trouble was got rid of. Before the sixties, a huge water scheme was introduced. This also was carried through at an enormous cost; and in Glasgow to-day they are very proud that their forefathers had the foresight and the wisdom to carry their water scheme through. Since then there had been the purification of the Clyde, which had been given very grave consideration by all thinking citizens. This had been carried through at the enormous cost of £2,250,000. In 1909, the crusade for purifying the air of the city was begun. He believed that something had also been done in this direction in other parts of Great Britain; but so far as Glasgow was concerned, they started by giving gas-cookers free on loan. They followed this up by hiring out gas-fires; and the result was that to-day there were no less than 177,000 gas appliances being handled by the people of Glasgow. If such work as this did not in some measure, at least, help on in the problem of air purification, he did not know what would. The general public must have it impressed upon them that they must use gas-fires and gas-cooking appliances instead of raw coal. An American lecturer once said that gas was coal with a university education; and this was exactly the position. In using gas, they were using purified coal. The remedy for the smoke nuisance was in the hands of the people themselves, as it was now commonly realized that all the trouble came from the domestic fires. In Glasgow, in spite of their large shipbuilding yards and other works, there was no trouble at all with smoke from the industrial works. In conclusion, he wished to emphasize the remarks of Sir Corbet Woodall at the opening ceremony—namely, that the exhibition was not a crusade against electricity, but a crusade for the use of gas. They must not believe that they are up-against electricity at all.

Professor Vivian Lewes, whose lecture was of a distinctly popular, although intensely interesting, character, confined himself to that part of the history of the gas industry which he termed "the reign of the luminous flame." He recounted the history from the first practical adaptation of coal gas for lighting purposes by Murdoch in the early years of the last century, and traced its development from the time when a cubic foot only gave one candle power until the period before the introduction of the incandescent mantle. The work of Priestley, Black, Scheele, and Lavoisier was all referred to, as were the subsequent efforts of Winsor to obtain parliamentary powers to supply gas to the public, and the gradual development of the Chartered Gas Company into the present Gaslight and Coke Company. Murdoch, Professor Lewes said, never claimed to be the inventor of gas, because the fact that gas could be distilled from coal was known a hundred years before Murdoch showed the way in which it could be purified and utilized for burning; but he turned a mythical idea into a practical success, though he reaped no reward for it. The latter part of Professor Lewes's lecture was taken up with an explanation of Sir Humphry Davy's work in connection with luminosity in a flame; and he repeated a number of Davy's early experiments, much to the liking of his audience.

There was a crowded audience to hear Professor Vivian Lewes's second lecture, which dealt with the development of the incandescent mantle. He said that there were two discoveries during the last century which really made gas—one the atmospheric burner,

THE ARTIST'S STUDIO, WITH GAS STANDARD FOR PROJECTING LIGHT ON TO PICTURES.

and the other the incandescent mantle. Both of these discoveries were made in the famous laboratories of Bunsen at Heidelberg; and it was to the now Sir Henry Roscoe, who was at the time working as a student in these laboratories, that the original suggestion was due of making a heating burner on the principle of the old experiment of Davy, in which a jet of unlighted coal gas passing through air could be lighted above a piece of wire-gauze held in the stream and burnt with a non-luminous flame—a suggestion which Bunsen converted in two days into the burner that bears his name. Professor Lewes then gave a rapid historical account of the experiments of Auer von Welsbach with the rare earths in providing the incandescent gas-mantle, from the early fragile products down to the present-day Plaissetty mantle. He concluded with a brief reference to the inverted mantle, and explained how it is possible to obtain a light of a prettier colour than the ordinary commercial mantle, which, however, had the disadvantage of a very short life.

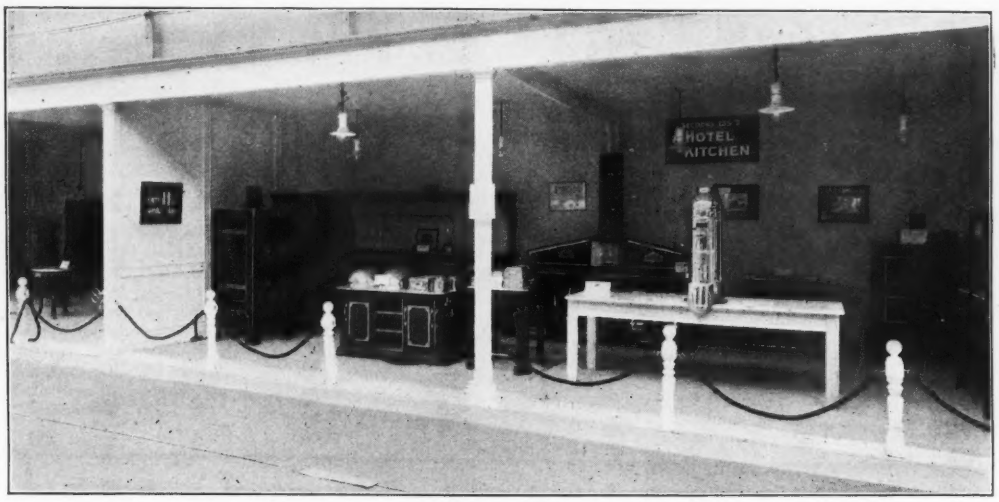
THE "SILENT SERVANT."

By Miss CONSTANCE WILLIAMS.

In discussing the "Silent Servant," in her lecture on Friday last, Miss Williams described shortly the rapid strides made during the last twenty years in the development of gas for domestic uses. She instanced the home of her youth, where gas was only used for lighting purposes by means of flat-flame burners. In the kitchen there was only a wide, open fire, with ovens at the side, and such a thing as a gas-fire in a living or bed room was unknown. It was not unusual for a new servant who had had no experience with the illuminant to blow out the gas in her room, sometimes with dire results.

The same house visited last Christmas had had a complete gas-stove fitted in the kitchen, hot water was available all over the house, and quarrels between the cook and the other servants were things of the past. It was no longer necessary, in dressing for a dance, to thaw one's fingers before adjourning to a cold bedroom. Meals were punctual, and the maid with smuts on her nose, whose duty it was to "see after the flues," was no longer needed. Service was reduced, and comfort increased. The sweep's services could be entirely dispensed with; and the solemn ceremony of "looking for his brush out of the chimney" was unknown.

In describing life in the modern flat or house, Miss Williams emphasized the increase in comfort and freedom from dirt to be achieved by the use of gas-fires for heating the rooms. One of the questions often asked by prospective servants was: "Do you use gas?" meaning not only in the kitchen, which has now become the rule rather than the exception, but in the rooms for heating. The lecturer next referred to the day of the small householder with perhaps one servant, who had taken the precaution to have gas installed—proving that punctual meals, a cleaner house, and less mental worry and wear and tear were the results. She drew a picture of the happy suburban couple returning after the theatre to a warm house and "something hot" before they went to bed, instead of finding a cold house or having expensive coal fires kept in all the evening. Miss Williams described the trials of a cottage in the country, which she finally



CATERERS' KITCHEN, SCHOOL COOKERY KITCHEN, AND HOTEL KITCHEN.

had to give up owing to the difficulty of keeping house where no gas was available.

To the artisan's wife, it was pointed out how useful was the gas-cooker, and how economical in the end; for it need only be used when wanted. In Lancashire, the cotton worker, who has sometimes to start for his work at 4.30 a.m., can have his hot breakfast, thanks to the gas-cooker. "A properly-used gas-cooker was the greatest enemy to the publican."

With regard to the hygienic side of the question, Miss Williams described how many doctors were being converted to the use of gas-fires in bedrooms—in many cases recommending them in nursing homes and for invalids. The bowl of water, thought by many people so necessary "to keep the air from drying," was dismissed with ridicule; for "there were no bad fumes from a properly-installed gas-fire." The old objection that gas-fires "are so ugly" was disposed of; "for," said the speaker, "all artistic and æsthetic tastes are considered now, and 'Adam,' 'Chippendale,' or any other style or 'period' can be obtained in order to suit a room."

In summing up, the lecturer urged that gas-fires were now perfectly healthy, saved time and trouble, were cleaner, and there was no waste, and prophesied that the time would come when coal for household purposes—in towns, at all events—would be a thing of the past, and when flue brushes and scrapers would hang on the walls as ornaments, like the old-fashioned warming-pan.

AN EXHIBITION COOKERY BOOK.

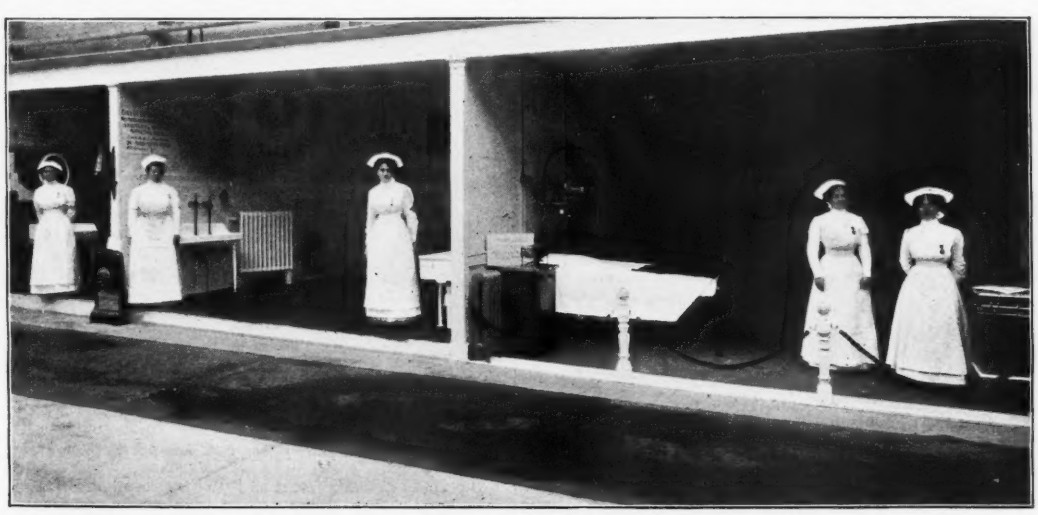
THE exhibition has given birth to a new cookery book. "Cooking by G.A.S." is the title. If the famous George Augustus Sala were alive now, he might object to the "points" after each of the capital letters. About the nature of the contents, he would have no reason to complain, nor would he on the score of the excellence of the literary and artistic work in it. The book has been compiled by Miss Helen Edden, M.C.A., and has been edited by Mrs. M. A. Cloudesley Brereton. These two names are alone sufficient guarantee of accuracy and quality. We have never seen a cookery book like it before. There is a preface on "A Woman's Day"—the day being spent in a house and kitchen where gas is used for cooking, heating, water-heating, and lighting. The preface is beautifully illustrated, each picture conveying a lesson. The initials "M. A. C. B." are at the end of the preface. The first chapter informs the reader how to use the gas-cooker. This and succeeding hints on all sorts of matters applying to the cuisine are accompanied by pictures full of life. There are suggestions for quickly cooked meals, instruction as to how to read a gas-meter, and some suggestions on kitchen stoves. Following are recipes, and information as to how to use them. At the back of the book is further useful matter, including sample menus for a week, and a cook's time-table. The book consists of 126 pages; and if it does not have a quick and copious sale at 1s., we shall be surprised. Copies are obtainable from Smith and Sons' bookstalls at the exhibition; but the publishers are the British Commercial Gas Association, 47, Victoria Street, S.W.

ELECTRICIANS AT THE EXHIBITION.

SOME of our electrical contemporaries comment on the unfinished appearance of affairs at the exhibition on Monday last week. The resources of the gas industry are great; the energy of the men who have organized the exhibition, apparently without limit. By Wednesday morning, the exhibition was an altogether different thing from what it was on Monday. The only two electrical papers that have so far commented on the display are anything but antagonistic. They agree that the electricity industry has something to learn from the gas industry.

[From the "ELECTRICIAN."]

As to the exhibits themselves, we must leave our readers to judge of the merits of gas as an illuminant, as a warming, cooking, and water-heating agent. We would strongly recommend the commercial men of the electricity departments in the London area to see everything they possibly can of the exhibits of gas cookers, fires, and water-heating appliances. The last-named are specially instructive. They demonstrate the anxiety of the gas interests to give a service to every class of householder, from the highest to the lowest. The wife of the artisan as well as the countess is to be encouraged to indulge in hot-water baths and the use of a



THE HOSPITAL SECTION.

hot-water supply obtained from gas-heated apparatus. Special note should be taken of the fact that the gas supply authorities, whether company or municipal, are extending the facilities for the hiring of practically all the appliances shown at the exhibition. It is possible to instal an automatic water-boiler in the cellar, which will supply hot water to any part of the house immediately the water-tap is turned on. This is a tremendous convenience, and one which will become more widely appreciated in proportion as it is put into more general service by the gas interests. There is nothing particularly remarkable about the design of these water-heaters. They appear to be highly efficient, and have the further advantage of occupying a small amount of space. It is not improbable that they may present points to the designers of similar apparatus in which electrical energy is the heating agent. So interesting, instructive, and in a measure unique, a collection of gas appliances will not be seen in London again for some years; and we hope that, during the month the exhibition is open, electrical men from all parts of the country will pay it a visit. They will be quite wrong in supposing that because it is a gas exhibition there will be nothing for them to worry about. On the contrary, they must remember that, from the points of view of organization and unanimity of purpose, the electrical industry has a great deal to learn from our gas friends.

[From "Electrical Industries."]

We have no hesitation in saying that the National Gas Exhibition positively demands a visit from every electrical man who can possibly manage to go. . . . On Monday evening last [Sept. 29] enough could be seen of the general arrangements being made to impress one with the idea that, when the exhibition is ready, it will be an uncommonly fine effort. We are under the impression that the National Gas Exhibition will prompt some rather serious mental comparisons with the exhibitions which the electrical industry has "organized" in the past. We are under the impression that at Shepherd's Bush the gas industry is about to show the electrical industry exactly in what way a popular lighting, cooking, and heating exhibition should be run. . . . At any rate, the organizers of the exhibition have produced a magnificent catalogue and programme (sold at the reasonable price of sixpence, and totally devoid of advertisements), the contents of the catalogue promising a wealth of exhibits of outstanding interest and importance.

DIARY OF EVENTS.

NATIONAL GAS CONGRESS AND EXHIBITION—October, 1913.

DAILY ATTRACTIONS.

String Band of the Scots Guards, 3 to 4.30 and 6 to 7.30, in the Domestic Section Hall.

Military Band, 8 to 9.45, in the Domestic Section Hall.

Music in the Tea Room, 4 to 5.

Cookery Lecture and Demonstration at 4 and 7.30 (except 7.30 on Oct. 31).

Preliminary Cookery Competitions Oct. 2 to Oct. 25 [inclusive] daily at 2 30 and 6 (except Oct. 8, 14, 22, and 23).

Tuesday, Oct. 7.

8 p.m.—Popular Lecture: "The Evolution of Gas Lighting and Heating" (Part III.). By Professor Vivian B. Lewes.

Wednesday, Oct. 8.

Visit of the Midland Association of Gas Engineers and Managers.

8 p.m.—Popular Lecture: "The Contents of a Lump of Coal." By Henry O'Connor, Esq.

Thursday, Oct. 9.

11 a.m.—**Conference on Coal Smoke Abatement.**

Papers to be read:—

"A Curse of Civilization." By Sir William Richmond.

"The Loss to Health and Pocket Caused by the Smoke Nuisance." By Sir William H. Bennett.

"The Gas Industry in Relation to Smoke Abatement." By Professor Vivian B. Lewes.

"What the Coal Smoke Abatement Society has done, and what it could do." By H. A. des Voeux, Esq.

8 p.m.—Popular Lecture: "The Contents of a Lump of Coal." By Henry O'Connor, Esq.

Friday, Oct. 10.

Visit of the Eastern Counties Gas Managers' Association.

8 p.m.—Popular Lecture: "From the Coalfield to the Burner." By Henry O'Connor, Esq.

Saturday, Oct. 11.

11 a.m.—**Conference of Educationists.**

Papers to be read:—

"Some Considerations on the Brightnesses of Lights." By Professor Silvanus Thompson.

"The Physiological and Mental Disadvantages of Unscientific Illumination." By Leon Gaster, Esq.

"Cookery in the School." By Miss Mildred Atkinson.

"The School of the Future." By Septimus Warwick, Esq., and Austen Hall, Esq.

8 p m.—Popular Lecture: "Harnessing the Forces of Nature for the Service of Man." By Arthur J. Martin, Esq.

Monday, Oct. 13.

8 p.m.—Popular Lecture: "The History of Fire Making." By Miller Christy, Esq.

Tuesday, Oct. 14.

11 a.m.—**Judging of Home Cookery Competitions.**

2 p.m.—**Conference on the Hygiene of Lighting and Heating.**

Papers to be read:—

"The Hygiene of Gas for Lighting." By Dr. Samuel Rideal.

"The Health Value of Radiant Heat." By Professor Leonard Hill.

"Modern Improvements in Gas Lighting and Heating Appliances." By Professor Vivian B. Lewes.

8 p.m.—Popular Lecture: "The Evolution of Gas Lighting and Heating" (Part I.). By Professor Vivian B. Lewes.

Wednesday, Oct. 15.

Visit of the Wales and Monmouthshire District Institution of Gas Engineers and Managers.

8 p.m.—Popular Lecture: "The Evolution of Gas Lighting and Heating" (Part II.). By Professor Vivian B. Lewes.

Thursday, Oct. 16.

PATRONS' DAY.

3 to 5 p.m.—**Reception (by Invitation only) by the PRESIDENT and LADY WOODALL.**

8 p.m.—POPULAR LECTURE: "The Gentlewoman in her Kitchen." By Mlle. Claire de Pratz.

Friday, Oct. 17.

Visit of the Irish Association of Gas Managers.

11 a.m.—**Conference on Some Aspects of Scientific Illumination.**

Papers to be read:—

"The Aims and Objects of the Illuminating Engineering Society." By Leon Gaster, Esq.

"The Economy of Efficient Lighting." By Franklin Thorp, Esq.

"Light and Sight." By Meredith Young, Esq.

8 p.m.—POPULAR LECTURE: "The Evolution of Gas Lighting and Heating" (Part III.). By Professor Vivian B. Lewes.

Saturday, Oct. 18.

Combined Visit of Junior Associations. Mr. F. W. Goodenough Presiding at Tea.

8 p.m.—POPULAR LECTURE: "The French Hostess and her English Sister." By Mlle. Claire de Pratz.

Monday, Oct. 20.

8 p.m.—POPULAR LECTURE: "Construction, Operation, Testing, and Reading of a Gas-Meter." By W. H. Y. Webber, Esq.

Tuesday, Oct. 21.

Annual Meeting and Conference of the British Commercial Gas Association at the City Guildhall.

8 p.m.—POPULAR LECTURE: "Practical Hints on the Use of Gas in Factory and Workshop." By W. H. Y. Webber, Esq.

Wednesday, Oct. 22.

Annual Meeting and Conference of the British Commercial Gas Association at the Exhibition.

11 a.m.—**Judging of Home Cookery Competitions.**

Meeting of the Executive of the Sulphate of Ammonia Committee.

Private Dinner of the Sulphate of Ammonia Committee.

8 p.m.—POPULAR LECTURE: "The Origin and History of Artificial Lighting and Heating." By Edward Lovett, Esq.

Thursday, Oct. 23.

Imperial and International Day.

10.30 a.m.—**International Meeting of Sulphate of Ammonia Makers in the Conference Room of No. 5 Hall.**

11 a.m.—**Judging of Home Cookery Competitions.**

8 p.m.—POPULAR LECTURE: "Hints to Gas Consumers on How to Get Value for Money." By John Young, Esq.

Friday, Oct. 24.

2 p.m.—**Conference on the Economics of the Home (continued on Saturday, Oct. 25).**

Papers to be read:—

"Domestic Service as a Career for Educated Women." By Mrs. M. A. Cloudesley Brereton.

"Fuel and Light in the Working Man's Budget." By Mrs. Margaret M'Killop.

"Coal Gas as a Fuel for Domestic Purposes." By F. W. Goodenough, Esq.

"The Wife as Bursar." By Miss Mabel Atkinson.

8 p.m.—POPULAR LECTURE: "Hints to Gas Consumers on How to Get Value for Money." By John Young, Esq.

Saturday, Oct. 25.

11.30 a.m.—**Conference on the Economics of the Home (continued from Friday, Oct. 24).**

8 p.m.—POPULAR LECTURE: "A Pennyworth of Gas." By Dr. C. W. Saleeby.

Monday, Oct. 27.

11 a.m.—**Judging of Home Cookery Competitions.**

6 p.m.—**Final Cookery Competition for Housewives.**

8 p.m.—POPULAR LECTURE: "The Use and Abuse of Light." By Leon Gaster, Esq.

Tuesday, Oct. 28.

11 a.m.—**Conference of Employers.**

Papers to be read:—

"Co-Partnership as a Means of Increasing the Prosperity of both Capital and Labour." By Aneurin Williams, Esq.

"The Relation of Science and Industry." By Surgeon-General Sir Alfred Keogh.

"Co-Operation between the School and the Employer." By Cloudesley Brereton, Esq., L. ès L. Paris, and D. Milne Watson, Esq.

"Natural Law in the Commercial World." By A. F. Sheldon, Esq.

2.30 p.m.—**Final Cookery Competition for Territorials (A and B).**

6 p.m.—**Final Cookery Competition for School Children.**

8 p.m.—POPULAR LECTURE; "Practical Hints on the Use of Gas in Factory and Workshop." By W. H. Y. Webber, Esq.

Wednesday, Oct. 29.

11 a.m.—**Conference of Manufacturers.**

Papers to be read:—

"The Lighting, Heating, and Ventilation of Factories and Workshops." By Professor Vivian B. Lewes.

"Gas as a Fuel for Industrial Purposes." By Professor W. A. Bone.

"The Economic Value of Adequate Illumination." By Leon Gaster, Esq.

"The Matching of Colours by Artificial Light." By T. Thorne Baker, Esq.

2.30 p.m.—**Final Cookery Competitions for Boy Scouts, Girl Scouts, and Church Lads.**

6 p.m.—**Final Cookery Competitions for Sea Scouts and Territorial Nurses.**

8 p.m.—POPULAR LECTURE: "Practical Hints on the Use of Gas in Factory and Workshop." By W. H. Y. Webber, Esq.

Thursday, Oct. 30.

2.30 p.m.—**Final Cookery Competition for Cook-Generals.**

8 p.m.—POPULAR LECTURE: "The Silent Servant." By Miss Constance Williams.

Friday, Oct. 31.

6 p.m.—**Presentation of Prizes to Winners in Cookery Competitions by the Lady Mayoress of London.**

8 p.m.—POPULAR LECTURE: "A Pennyworth of Gas." By Dr. C. W. Saleeby.

Saturday, Nov. 1.

8 p.m.—POPULAR LECTURE: "Construction, Operation, Testing, and Reading of a Gas-Meter." By W. H. Y. Webber, Esq.

ELECTRICITY SUPPLY MEMORANDA.

Lamp Price Reductions.

The leading manufacturers of metallic filament lamps are making a little compensation to the electric supply industry for the terrible shock they gave it recently over the prospect of the advent of domestic lamps having an efficiency of half-watt-hour per candle. They have now announced reductions in price of the present metallic filament lamps from 3d. upwards. Lamps for 100 to 135 volts, and rated from 10 to 60 watts, have been lowered from 2s. 6d. to 2s. 2d.; and for 200 to 260 volts from 3s. to 2s. 8d. The 15 and 20 watt lamps are now priced at 3s. 3d. and 2s. 11d. instead of respectively 3s. 6d. and 3s. 3d. The 100-watt lamp is now to be sold at 4s. 3d., instead of 4s. 9d.; the 200-watt lamp, at 8s. 6d. in place of 9s.; and the 300-400 watt sizes at 16s. instead of 17s. The reductions are asserted to be due to further economies in manufacturing processes, combined with increased outputs. But some electrical people are still waiting to hear the truth of the matter. Turning from this country to Germany, the "Electrical Review" states that the trade contest in wire lamps in the Fatherland is now very keen. It prevails both among the small firms themselves and between the small firms and the large firms, as well as between the three largest producers. The present depression in prices dates back to last April, when the list prices of the leading firms were lowered by about 30 per cent., but, on the other hand, the discounts to retailers were reduced by 10 per cent. The fall in prices has not been fully equalized by an increased turnover and improvements in manufacturing; so that the profits earned per lamp have largely declined in those cases where profits have been realized, while in instances where losses have been incurred, these have become greater. The small lamp factories mostly produce the squirted filament; but where this practice does not prevail, legal proceedings are in progress in respect of alleged infringement. In any case, it is only possible to secure the continuance of the sales to contractors of the less durable lamps, by offering them larger profits on the business done; and the under-selling which thereby results forces the large German producers to adopt a similar attitude. There are German metallic filament lamps sold in this country.

Semi-Indirect Lighting Fittings.

Nearly every week now, the Electrical Press announces some new makes of semi-indirect lighting fittings. In form there is not a great deal of difference between them; but the electrical industry has found that there is a largely extending knowledge on the part of the public that, for some reason or other (the general public does not know much about high intrinsic brilliancy and ultra-violet rays), the metallic filament lamp has not any friendly tendency in the matter of the preservation of eyesight. Therefore the electrical industry sees good ground for driving into use as hard as they possibly can semi-indirect fittings, consisting of suspended bowls, in order to help to counteract this extending knowledge as to the detrimental effects of the electric light. But apart from the primary object of the advocacy by the electricity industry of the use of such fittings, we must say that we like the appearance of the best types of these fittings; and so do many other of the customers of the gas industry. Long before the electrical industry adopted fittings of the kind, however, Sugg (and maybe other makers of gas appliances) introduced suspension fittings partaking of like character. But then the purpose was decorative, and not specially for semi-indirect lighting. Tastes, like times, change; and there is a demand for such gas-fittings to-day. At the National Gas Exhibition will be seen semi-indirect fittings of various types, by various makers, who are doing good business in them. The point, however, that the gas industry can make is that it supplies a light of better quality for the eyes than the electricity industry, and can give more light for a given price; and therefore in the use of semi-indirect fittings above which the source of light is obscured, the gas industry gives to users a better all-round return for their expenditure than the competing industry. Semi-indirect fittings, with these points forced home, will have a good effect upon any householders or tradesmen who rather fancy they would like to adopt electricity. There is no reason why they should do so; there are several good reasons why they should not do so.

Flat-Bottomed Utensils.

The inefficiency of electricity for all boiling operations is well known, even though the utensils used have flat bottoms so that perfect contact is made with the heating elements. When the utensil bottoms lose their pristine evenness, which is very soon after Mary Ann has had the handling of them, the efficiency through bottom blemishes drops to a point that has a very bad effect on that lady and the household generally. Even in the well-ordered flat of Professor J. T. Morris (according to the paper he read before the British Association, in which he embodied some useful electrical confessions) this irritating trouble is experienced, as noticed in other parts of the "Journal" at the time the paper was published. With thin and tender bottoms to utensils, so as to secure as promptly as possible the transmission of a portion of such heat as the electrical energy can boast of, the efficiency is not at all high. To overcome the trouble, Messrs. Purcell and Nobbs appear to have hit upon the unhappy notion of further reducing the efficiency by securing the bottoms against undue violent treatment. Their method is to have cast-iron utensils with special bottoms machined perfectly flat, and tinned inside or coated with porcelain enamel. This may be better than a dented thin bottomed utensil; but it seems to us for electrical purposes the prevention of indentations will permanently mean increased expense for heating energy. With fervour, we repeat, "Thank goodness for the simplicity of the gas-cooker and all that appertains thereto."

The Doom of the Gas-Cooker.

"Electrical Industries" has on its staff a prophet. The "Electrician" used to have one; but the consummation of his early predictions is being so long deferred, and appears to be farther off than ever, that he has given up the *rôle* of the prophet. Our dear old friend the "Electrical Review," which has become so erratic, used also to prophesy, indulge in "last-ditch" tales, and open its columns to hare-brained contributors who thought that gas supply ought to be prohibited, and for the manufacture of what are at present the secondary products of coal carbonization, the works ought to be removed to the coast, away from populated places. But there is a little less disposition to this sort of thing nowadays. Still, while it lasted, it was all good fun for the men of the gas industry. The new prophet who has through "Electrical Industries" descended to this mundane sphere of ours, states: "For ordinary householders, the coal-range is as much a thing of the past as the gas-range will be in another five or ten years." Why five years? Why not two or three years? Why, too, make the quinquennium period the alternative one? It would have been safer perhaps to have said 50 or 100 years, because the prophet by the latter period would have been removed to another place where he could not be called upon to account for the non-consummation of his prophecy.

Lending Appliances Free.

The "Electrical Times" is getting rather worried over the loaning free of gas appliances; and, for the second time within immediate weeks, it has stated that it knows of more than one instance in the London area where the gas companies have been compelled to offer gas cooking equipments free, as the only way of keeping out electricity. Instead of continuing vague over the matter, will the "Electrical Times" kindly name the "gas companies?" If it be true, the gas companies concerned are not likely to be in the least annoyed over the revelation. The companies do not fear electric cooking and heating, nor are electric cooking and heating becoming a nightmare to the companies. As "Meteor" seems to have overlooked a paragraph upon this subject that recently appeared in these columns, let us repeat that there are several undertakings that have been for years lending free of direct cost gas-cooking appliances. There is nothing new in the policy. Other gas undertakings have seen that it is a good proposition in the development of business, and have adopted it, and probably others will follow the lead of these concerns. Electricity undertakings have barred themselves from doing the like. It cannot possibly be done with electricity at 1d. or ½d. per unit; it can be done where the price of gas for cooking and heating is at lighting rates which make the good consumption by cooking and heating appliances very profitable business. We have in mind an undertaking where nothing more than a single inclusive price is charged for all domestic purposes—including gas and meter, the loan of a cooker and fires, the maintenance of burners, and the supply of two mantles a year. The price of gas could be reduced by pence if only rents were charged for all these things. But with the consumers so satisfied, the revenue account of this particular concern is always on the up-grade; and it rarely nowadays loses a consumer. Could electricity concerns follow this example with the tariffs they have adopted? A two-lettered word is the reply.

Double Traits of the "Review."

In last week's issue, we quoted some graceful remarks by "Meteor" of the "Electrical Times" on the subject of the National Gas Exhibition. We began reading an editorial article in the "Electrical Review" thinking we should have to quote it as another evidence of good feeling on the part of one of our contemporaries. The reading ended with the impression that it comes quite natural to some electrical writers to within a few minutes show a double mental tendency. There is sanity in the first part of the "Review" article; and evidence of crass stupidity and cynicism in the second part. *Exempli gratia* of the former:

> During October, a Gas Exhibition will be held in the Uxbridge Road Galleries of the "White City," which will present several novel features, which show how the industry as a whole is working for the benefit of everyone concerned. The plan usually followed in exhibitions has been abandoned, and in place of the customary rows of stands and stalls advertising the wares of competing firms, the town-gas lions will, so to speak, lie down with the producer-gas lambs and present an appearance of absolute harmony, which cannot fail to have an appreciable effect on the visiting public. In other words, the exhibition is planned and will be laid out solely with the view of popularizing gas, showing what gas can do in the home, the office, the shop, and the factory; showing how it can light, warm, and ventilate a house or a

church; showing how it can cook anything, from an egg to an ox; how it can drive anything, from a sewing machine to a rolling-mill.

Of course, there is no producer-gas plant in the exhibition. *Exempli gratia* of the silly and cynical sides of the article:

The safety of gas lighting and power will be demonstrated; its wonderful hygienic powers will be proved. It will probably be shown that it cannot dirty a ceiling, or injure a growing plant; it may be shown that the headache so frequently experienced by those who live in gas-lighted and gas-heated rooms is really due to some sort of brain reaction caused by the intense enjoyment due to the adoption of that particular method of illuminating and warming the premises. At the time of writing, it is not definitely known whether the advantages of gas lighting for express passenger trains will receive more than passing attention; but it is known that no efforts will be spared at this exhibition to prove to the public that electricity is practically obsolete, and that gas, used in any form or for any purpose, is immeasurably its superior.

What the writer means by all this is best known to himself; but the mental density that it reveals, as well as the lack of technical knowledge, shows that it would be waste of time to try to drive home a few plain truths in that quarter. Far from endeavouring to prove that electricity is practically obsolete, the exhibition will show large users of electricity that the gas industry can generate electrical energy for any purpose (if it is preferred) in a manner that a little investigation will declare will produce for them an all-round economy compared with the average price paid to the suppliers of current by means of the distribution system of a central generating station. There are in existence to-day many such private installations using gas-driven plant, with which the local electricity suppliers cannot compete. The gas industry is out to serve the public in any direction in which gas or coke can be used, and there is profit to be made. The "Electrical Review" appears to be suffering, in regard to gas matters, from acute myopia. One of the greatest of human mistakes is to ignore strength and truth. If the "Review" requires a few more instances of the silly side of its treatment of gas affairs, we will turn them up after the National Gas Exhibition closes its doors. Meanwhile, its editors might compare the words last quoted from their columns with the dignified expressions of Sir Corbet Woodall, in his after-luncheon speech, at the opening of the exhibition.

The "Safety" of Electricity.

The Home Office are, with excellent vigilance, pursuing their campaign against those mineowners who will persist in ignoring the Department's regulations, which were devised for the purpose of making as safe as possible installations of electricity in mines. Reference has been made in the "Memoranda" to various cases in which mineowners and managers have been called to account before magistrates for infringement or neglect of the regulations. Other cases are before us. At the Old Hill Court, the owners of Corngreaves Collieries have been summoned and fined for having exposed places on cables in their mine. The voltage is only 220 direct current and 200 alternating current. Certain terminals were found unprotected or unenclosed in a manner to prevent accidental contact. This is as things should not be, as there have been several fatalities at the voltages mentioned. Besides it was found that there were bare places on the power and lighting wires, some of them being due to the fact that lamps had been affixed to the cables, and, when removed, the copper was left exposed. Another case has lately been before the Hamilton Sheriff Court; the colliery concerned being the Dalnell and Broomside, near Motherwell. While on this subject, it is noticeable that certain of our conscientious electrical contemporaries continue to insist on electrical apparatus in bathrooms of private houses, as well as heating and cooking apparatus in the home, having their metal parts earthed. The writer of the "Cooking and Heating Notes" in the "Electrical Times" has once again been advising that all possible precautions in this way should be taken against shock. If the framework of such appliances be earthed, there can, he says, be no risk of shock. This has to be qualified by the words, provided all live conductors are properly insulated, heating elements are protected from risk of accidental contact, and wires have their insulation protected against deterioration by heat. It is well to make this qualification.

Tercentenary of the New River.—Monday last week was the tercentenary of the New River, the waters of which were, on Sept. 29, 1613, brought from Hertfordshire by Hugh Myddelton for the supply of London, which had previously depended upon various conduits, a system of reservoirs at Hampstead, and the water-works in the arches of Old London Bridge. The history of the great undertaking is sketched in an interesting communication by a correspondent which appeared in "The Times" on the 29th prox. Notwithstanding modern enlargements as well as additional reservoirs, the New River remains, in its essentials as planned by Myddelton, who did not make any great fortune out of the work, and died a poor man. However, a baronetcy was conferred upon him; and a statue has been erected to his memory on Islington Green. Now that the water supply of London is administered by the Metropolitan Water Board, the New River Company exists only to manage the various lands acquired from time to time, and the house property erected thereon.

DELIVERING GAS APPLIANCES BY MOTOR LORRY.

Successful Experiment by Messrs. Thomas Glover and Co.

In consequence of the recent railway strike in Birmingham, and the resultant inability of the Railway Companies to accept goods to or from that district, Messrs. Thomas Glover and Co., Limited, were compelled to send goods for their Midland customers by road from London by their own motor lorries. At the same time

the lorries delivered gas cookers and fires for the associated firm of Messrs. R. & A. Main, Limited. The experiment was so successful that the firm have instituted a regular motor service to Birmingham; and the accompanying illustration shows one of the lorries before starting. The radius of their road deliveries now extends to upwards of a hundred miles.

ENGLISH v. CONTINENTAL COKE-OVEN BRICKS.

It may be remembered that, at the recent meeting of the Iron and Steel Institute in Brussels, comparisons were made, in the course of the discussion of the paper by Baron Coppée on the manufacture of coke and residual products in Belgium, between English and foreign fire-bricks used for bye-product coke-ovens; the remarks, which were briefly reported in the "Journal" for the 9th ult., being rather unfavourable to English-made bricks. We have received the following communication on the subject from Messrs. King Bros., Limited, of Stourbridge.

With all due respect to the views of some of the speakers, we feel that, as one of the largest English makers of bye-product oven wall fire-bricks, we should like to make just a few comments on behalf of the British fire-brick manufacturers. It was generally admitted that in the old type of oven the English fire-bricks were perfectly satisfactory; but in the new type of oven they are not so satisfactory as the foreign bricks, though they stand the high temperature equally well. It is recognized among manufacturers that the class of brick suitable for the old type of oven is not necessarily suitable for the new type, as the bricks are subject to more stringent tests, and require to be of a much higher quality and be more carefully manufactured. Consequently a higher price is asked for them. In many cases, English fire-bricks, as a whole, have been condemned as unfit by foreign oven companies, because of the failure of a brand of brick to withstand the tests. It is hardly fair to condemn the whole because of the failure of one brand of fire-brick; and makers who were in a position to supply a suitable brick were passed over on account of their higher price.

Again, there is the question: Are English manufacturers treated the same as their foreign competitors? A large number of bye-product oven construction companies are Continental firms who design and build the ovens, and naturally have a leaning to their own countries' bricks. When this type of oven was first constructed abroad, foreign fire-brick manufacturers obtained a considerable advantage in being first in the field; and they gained initial knowledge before the English makers started to supply this class of brick. We have many times approached the construction companies, soliciting only the trial of a few walls of our bricks in some of their new plants; but, though we are able to secure repair orders, we are told that they are afraid to use the English bricks in the original contracts. If English firms who are having batteries built would support their fellow manufacturers, and insist on English bricks having an equal chance and trial with the foreigners, the British fire-brick manufacturers would be encouraged to supply them with a brick as good as the foreign.

In conclusion, we may say that we are open to compete with foreign manufactured bricks, and before doing so are prepared to give references of many years' standing as to the quality of our material and manufacture. All we require is fair treatment—a trial, and not to have all English bricks condemned because of some failure.

Manchester District Institution of Gas Engineers.—We learn from the Hon. Secretary (Mr. W. Whatmough, of Heywood) that the Committee have decided, for the next meeting, to visit the bye-products works of the Old Silkstone Collieries, Limited, on the 1st prox., and not to have a special day at the National Gas Exhibition. The latter decision is consequent upon the refusal of the Railway Companies to grant facilities to the Association, and the difficulty of arranging for the members to meet at the exhibition. Further particulars will be announced later.

THE DEMPSTER-TOOGOOD SYSTEM OF CONTINUOUS VERTICAL RETORT CARBONIZATION.

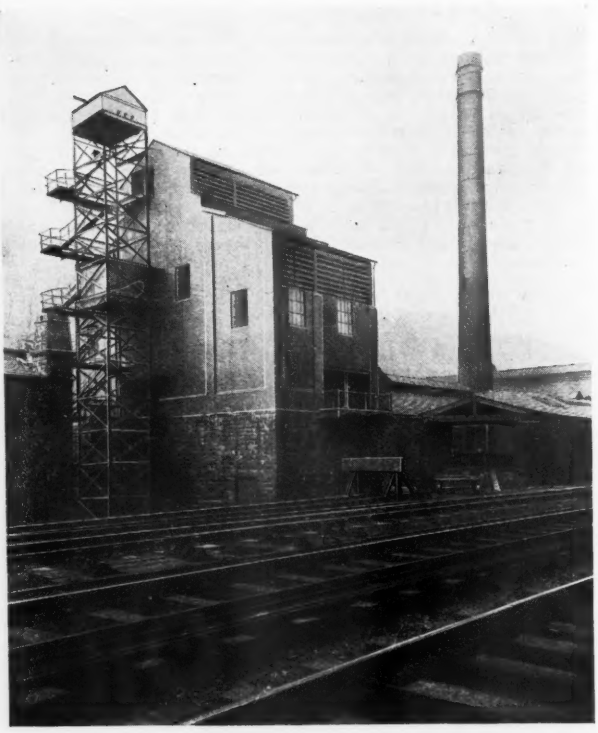
First Installation at Hebden Bridge.

[COMMUNICATED.]

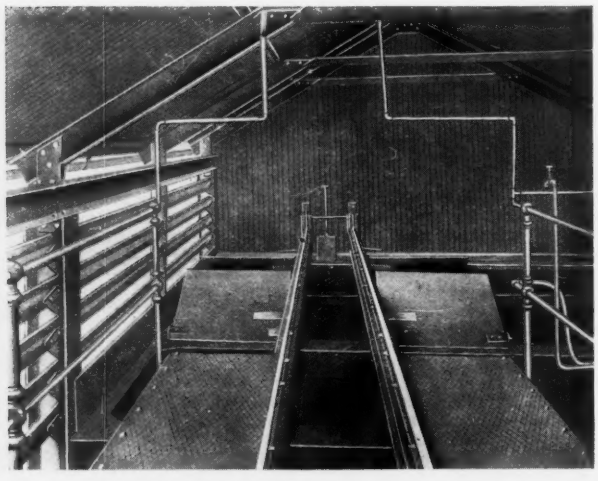
UNPRECEDENTED as the progress of continuous carbonization has been, it cannot be supposed that finality has been reached. Experience results in a development of detail more suitable to the circumstances; and it is this improved detail, rather than any drastic change in the accepted principle of continuous carbonization, that is a feature of the Dempster-Toogood system, an installation of which has been put up at the works of the Hebden Bridge and Mytholmroyd Gas Board. The patentees submitted their proposals; and the Gas Engineer (Mr. E. J. Wellens), having satisfied himself personally of the soundness of their proposition, recommended to the Board the building of the first unit at his works at Hebden Bridge. It consists of four retorts to carbonize 20 tons of coal per day; and it has been put into operation with every promise of success. It would, of course, be premature to attempt any detailed description of the installation; but as its origin coincides with the opening of the National Gas Exhibition, we avail ourselves of the opportunity of describing the features of the system for which improvements are claimed.

Referring to the accompanying illustrations, it will be seen that novel detail extends throughout the scheme, from the overhead storage hoppers to the dry quenched-coke containers at the bottom. Following the path of the coal, it will be noticed that the gas-tight valve has two inlets. One is for coal, and the other may be used for coal or coke; thus doing away with dust in intermittently charging with coke after periods of scurfing. The plug of the valve being vertical, shearing of coal is avoided when in operation, and the dirt can work down and out of the vertical faces, thereby rendering the valve self-cleaning.

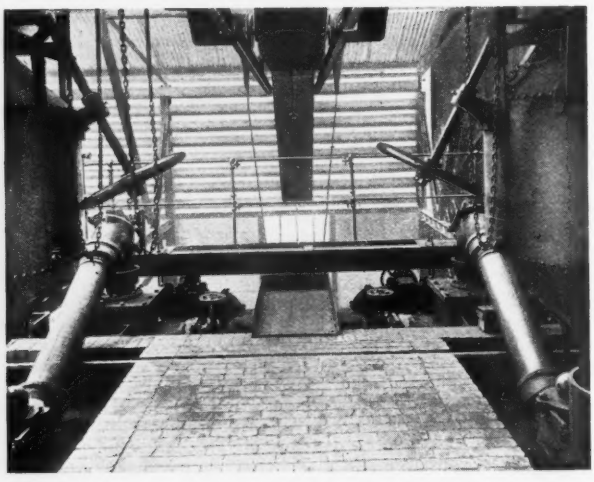
The coal enters the retort on its centre; hence the lumps gravitate to the ends of the cross section of the retort, thereby setting up at once, and automatically, a balanced state of the charge. By permitting easy passage of the heat, the lumps will carbonize rather more quickly, and, by shrinking more on carbonization in the known manner will, it is claimed, better free the charge from



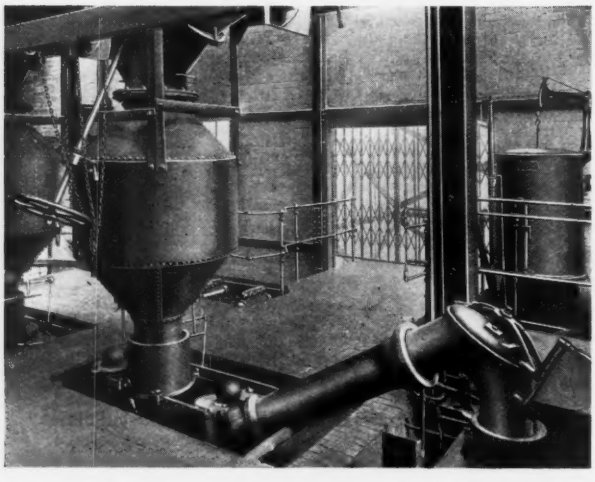
View of the Retort-House, with the Coal and Coke Hoist.



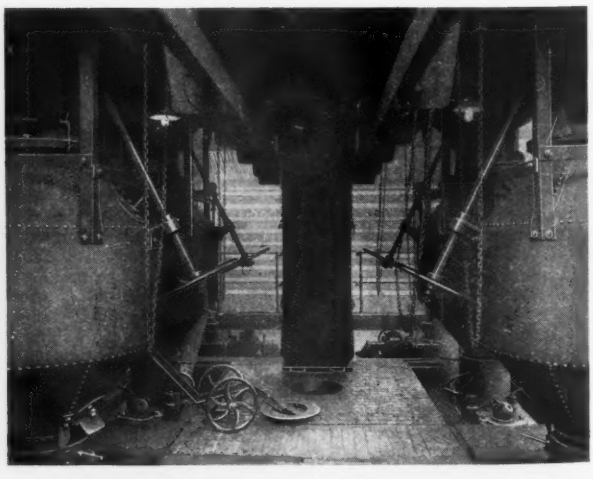
Top of the Coal and Coke Storage Hopper.



Bench Top, Showing the Separate Hydraulic Main.



Patent Method of Supplying Coal to the Retort through a Vertical Gas-Tight Valve.



Charging the Furnaces from the Coke-Storage Hopper.

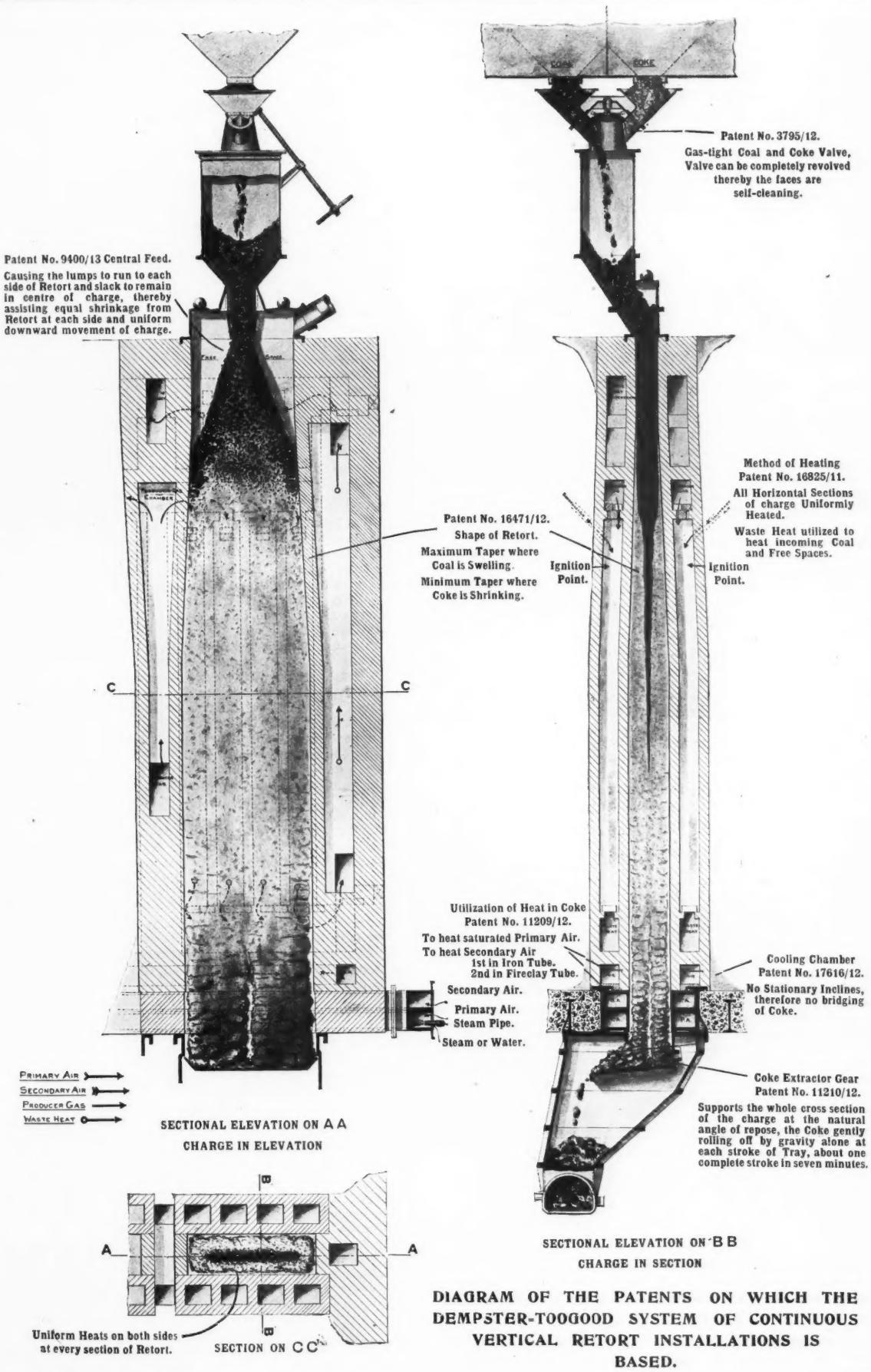
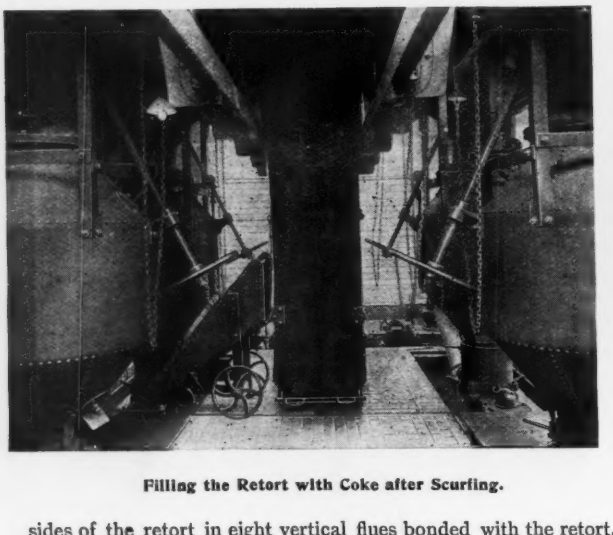

Patent No. 3795/12.
Gas-tight Coal and Coke Valve, Valve can be completely revolved thereby the faces are self-cleaning.
Patent No. 9400/13 Central Feed.
Causing the lumps to run to each side of Retort and slack to remain in centre of charge, thereby assisting equal shrinkage from Retort at each side and uniform downward movement of charge.
Method of Heating Patent No. 16825/11.
All Horizontal Sections of charge Uniformly Heated.
Waste Heat utilized to heat incoming Coal and Free Spaces.
Patent No. 16471/12.
Shape of Retort.
Maximum Taper where Coal is Swelling.
Minimum Taper where Coke is Shrinking.
Ignition Point.
Ignition Point.
C
C
Utilization of Heat in Coke Patent No. 11209/12.
To heat saturated Primary Air.
To heat Secondary Air
1st in Iron Tube.
2nd in Fireclay Tube.
Cooling Chamber Patent No. 17616/12.
No Stationary Inclines, therefore no bridging of Coke.
Secondary Air.
Primary Air.
Steam Pipe.
Steam or Water.
Coke Extractor Gear Patent No. 11210/12.
Supports the whole cross section of the charge at the natural angle of repose, the Coke gently rolling off by gravity alone at each stroke of Tray, about one complete stroke in seven minutes.
PRIMARY AIR
SECONDARY AIR
PRODUCER GAS
WASTE HEAT
SECTIONAL ELEVATION ON A A
CHARGE IN ELEVATION
SECTIONAL ELEVATION ON B B
CHARGE IN SECTION
B
A
A
B
Uniform Heats on both sides at every section of Retort.
SECTION ON C C

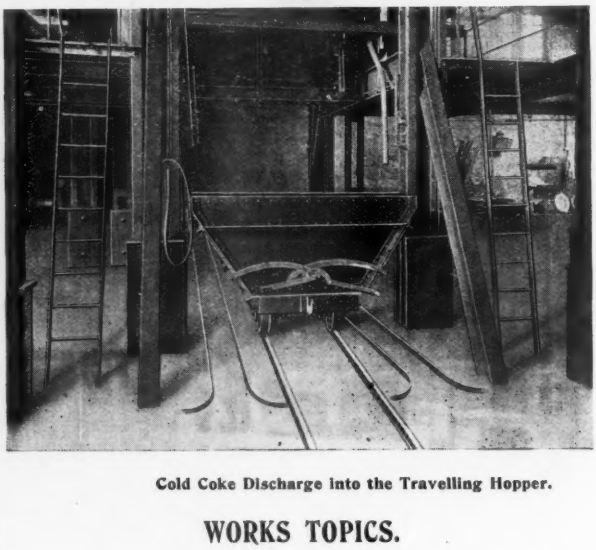
DIAGRAM OF THE PATENTS ON WHICH THE DEMPSTER-TOOGOOD SYSTEM OF CONTINUOUS VERTICAL RETORT INSTALLATIONS IS BASED.

the retort on both sides simultaneously, and facilitate that *desideratum* of continuous carbonization—the uniform downward movement of the charge under the action of the gentle force of gravity alone. Moreover, the coal will lie at the angle of repose for heated coal, which is, of course, steeper than for cold coal—thus permitting the free escape of the evolved gases from below, and facilitating any necessary poking of the charge on each side of the coal intake to maintain the equilibrium of the downward movement of the charge.

At or about the base of the pyramid of coal thus formed on the surface of the charge in each retort, the combustion of the heating gases takes place; the products being led down the broad



Filling the Retort with Coke after Scurfing.



Cold Coke Discharge into the Travelling Hopper.

sides of the retort in eight vertical flues bonded with the retort, and consisting of grooved and tongued bricks. The total products of combustion from the eight flues intermingle, pass up a vertical flue, and flow round the top of the retort, where the last traces of combustible heating gases are burnt, and the heat is utilized in warming the free spaces to crack the outgoing vapours to permanent gas and in heating the incoming cold coals. The waste heat on its way to the chimney is then led through the usual regenerator to heat the incoming secondary air.

It is to be observed that each cross section of the charge is uniformly heated, thereby maintaining the before-mentioned ideal of equilibrium of the charge. The available taper of the retort in the system under notice is so disposed that it is at a maximum where the coal is swelling and at a minimum where the coke is shrinking; and thus much of the advantage of a big taper is obtained, while obviating its disadvantages.

To facilitate the cooling of the cross section of the charge of coke, the cooling chamber, or the retort extension, is of gradually increasing cross-sectional area, so that there are no ledges or supports other than the moving mechanism. As a consequence of this, the fissures in the cooling coke are gently shaken open, allowing the heat to escape and be utilized in the cooling flues. An interesting fact in connection with this system is that so cool does the coke leave the cooling chamber that at Hebden Bridge some of it is loaded direct from the retorts into the consumers' carts, as shown—a proceeding which is probably unique in the annals of the gas profession.

The cooling flues are three in number; and dampers are provided so that the tubes may be connected to heat the primary or secondary air. For example, the bottom tube utilizes the lowest temperature of the coke to warm the primary air, saturated with water vapour, on its way to the furnace. The middle tube preliminarily warms the incoming secondary air, which in returning through the top flue utilizes the maximum temperature of the spent coke to heat the secondary air at the highest temperature of the coke. The secondary air is further heated in an ordinary regenerator on its way to the combustion chambers.

The extractor gear is arranged to receive the maximum cross section of the charge; the weight of the charge being chiefly supported by thrust against the retort sides. The gear consists of a slowly reciprocating tray, the stroke of which is capable of being adjusted over a wide range. In practice it works so freely that it can be manipulated by hand. Its action on the charge is very gentle, producing no breeze, yet by its gently backward thrust preventing any bridging of the coke; and it will handle without breakage the largest coke that can be formed within the retort.

Steel Tubes for Conveying Water.

Readers of the "JOURNAL" may remember the inquiry which was made some time ago into the circumstances of the corrosion of a large water-main at Coolgardie, Western Australia, the report on which was noticed in our columns on Jan. 16 last year (p. 158). The main in question was laid, without protective wrapping, in highly corrosive soil—the nature of which is attested by the fact that similar trouble with corrosion occurred with wrought and cast iron mains laid in the same neighbourhood—and was composed of thin plates joined together by a particular system. The corrosion was external. It has now been established that steel tubes, properly coated, efficiently jointed, and well and carefully laid, are perfectly satisfactory for this class of work. We learn from the British Mannesmann Tube Company, Limited, that the damaged part of the water-main in question is to be replaced by Mannesmann steel spigot and faucet tubes of 30 inches diameter. This fact is the more important as the opponents of steel tubes have endeavoured in the past to make some capital out of the Coolgardie inquiry.

We are informed that Mr. G. D. Bidwell has resigned the position of London Manager of Messrs. James Milne and Son.

WORKS TOPICS.

By "MODUS OPERANDI."

THE relative cost of making coal gas and carburetted water gas is a subject which has been exhaustively discussed during the past few months by the directors and engineers of gas undertakings supplying the mixture. There appears to be no solution of the difficulty. The fact is (as readers know well) that oil has more than doubled, and even trebled, in price during the past few years, with the result that in many works the cost of oil alone per 1000 cubic feet in making water gas exceeds the entire cost of making coal gas. And this is so in spite of the fact that coal is at a very high figure. With oil at (say) 4d. per gallon, it is in most works necessary, in spite of the price, to use about 2¼ gallons per 1000 cubic feet, so as to maintain the calorific power of the mixture. It must be remembered that on this basis 17½-candle power carburetted water gas and 14-candle power coal gas are much on a par. Although working to an illuminating power standard, engineers are alive to the consumers' interests; and for this reason it is impracticable to reduce the consumption of oil without decreasing the calorific value of the mixture below that of undiluted coal gas of a 14 or even 13½ candle power quality. The alternative is, of course, to save (say) half-a-gallon of oil per 1000 cubic feet carburetted water gas, making it of 14-candle power, and mix it with coal gas of 15-candle power, assuming that the illuminating power standard is 14 candles. If this is done, there will assuredly be more money lost on the coal-gas plant than will be saved on the carburetted water-gas plant. Those engineers who are working to produce high make per ton with heavy charges know full well that to increase the quality of the coal gas from 13½ or 14 candles to that of 15 candles means a drop of 10 per cent. and more in the make per ton, and almost a similar increase in the cost of making the gas. Thus with a mixture of 75 per cent. coal gas and 25 per cent. carburetted water gas though 2d. per 1000 cubic feet may be saved on the latter, an additional sum of about 2¾d. will be lost on the former. The fact, in the writer's opinion, is that the loss is greater than the gain. This is especially so if considered on a calorific value basis; for with coal gas if you lower its quality by 10 per cent. on an illuminating power basis, you do not reduce its quality to the same extent upon a calorific value basis.

In this column, it is not possible to go deeply into this question. It must be left to each individual engineer. There is, however, another important factor which, in most cases, has probably a greater influence on the question of the proportion of the two gases to be made; and that is whether coke can or cannot be sold at a remunerative price should an undue proportion of coal gas be made. So often the use of a water-gas plant is sufficient to relieve the coke market of all that would otherwise have to be sold as a surplus at a low price. For this reason, carburetted water gas, expensive though it may be to make, will still continue to be supplied with the coal gas.

Most of us are convinced that, given energy and business-like methods, much improvement can be effected in the coke market. In boilers alone, thousands of tons of coke could be consumed annually. Steamers which now use coal universally could in many cases burn coke to advantage on short trips where bunker storage is not so important a matter. The thousands of steam waggons now in use might also consume large quantities of coke. These are merely but one or two instances of what might be done. A great deal of conservatism has to be attacked; but this has been done before, and can be done again. The prejudice against gas cooking when first introduced is a case in point. In the case of coke, stokers and firemen are almost invariably inimical to its use. To a very large extent these men control the situation; but where employers are favourably impressed, this difficulty can be surmounted. The absence of smoke where coke is used is an important point, and would not be overlooked by any coal user. The suitability of grates, the question of draught and capacity of

boilers must also be considered, and difficulties overcome. Where coke cannot be introduced entirely in place of coal, it might often be partly adopted for mixing with it. For many purposes a mixture is admirable; and this is especially the case for domestic use. For this connection there is no better way of advertising its advantages than by pushing the sale of coke in 28 lb. bags. In many instances, these act the part of a sample—on the next occasion the customer orders the coke in a larger quantity. It would be an advantage if the paper bags, in addition to the usual inscription, were printed with the words "To be used alone or mixed with coal."

But if much is to be done in the extension of the sale of coke, let it be made clear that coke can be supplied in any required size. It is a great mistake to suppose that everyone wants coke only in large pieces. For boilers, small screened coke—the smaller the better—is an excellent fuel, and is burnt to better advantage than if used in large pieces. In creating this new market, it will be the greatest mistake to attempt to extract too high a price from new customers. Let them be impressed with the extent of the possible saving should coke be a success, and then they will be much more likely to give the matter their own personal attention, which will always be necessary in overcoming the prejudices of stokers. It must be remembered that, in creating new markets for coke, the object is to dispose of a surplus for which a low price is expected. Therefore, to gain the right sort of custom, something in the way of price must be foregone if any real success is to be achieved.

The question of the disposal of coke is a digression the writer admits; but the two matters discussed above are so closely connected that the one cannot be considered without the other.

KOPPERS DIRECT AMMONIA-RECOVERY PROCESS.

In the "Journal" for Sept. 16 reference was made to the new central gas-works at Budapest. We are able to-day to give a short description of the direct ammonia-recovery plant, translated from a brochure issued by the makers, Messrs. Heinrich Koppers, of Essen a.d. Ruhr.

In the so-called "direct process" for the recovery of ammonia, the gas is used as a carrier of the ammonia fumes, and with them it is passed through a bath containing a certain excess percentage of sulphuric acid. Thus practically the whole of the ammonia goes into combination as ammonium sulphate, which is crystallized out by concentration of the bath. Exact determinations and coke-oven practice have established the fact that the gas, in passing through the acid bath, undergoes no alteration as regards calorific value or composition; so that there is nothing to prevent the introduction of the process into the lighting-gas industry. Further it may be mentioned that the process has received widespread adoption among coke-ovens in Germany, many of which now supply large districts with gas for lighting. Budapest is, the makers claim, the first to have introduced the direct process into gas-works practice, having recognized its many advantages, and installed it in the new central gas-works. The following details will give a general idea of the plant shortly to start work.

The gas, from which ammonia and tar are to be recovered, is produced in an installation of 78 Koppers horizontal regenerative chamber ovens. From these the gas is passed into four hydraulic mains, each about 65 feet long. The composition of the gas is the same as ordinary retort-produced gas. With the present development of the works, about 9½ million cubic feet of gas have to be dealt with per 24 hours. For this purpose there are three complete installations of the ammonia recovery plant, each able to deal with half the production, so that one can be held in reserve. The buildings are so planned that the daily capacity can be almost doubled.

In general, the installation according to Koppers' patented system consists in the coolers for lowering the temperature of the gas and condensing water and tar; the exhausters; the tar separator for freeing the cooled gas of any tar that remains in it; the gas heater; and the automatic saturator for effecting the combination of the ammonia. A distillation column and a centrifuge complete the installation. On the Budapest works the gas is drawn from the ovens by two turbo-exhausters, each driven by a steam turbine. It passes first through a cooling plant of over 18,000 square feet water-cooled surface. The four coolers are connected with the hydraulics by means of two separate pipes of nearly 3 feet diameter each. For the regulation of pressure in the hydraulic mains, automatically working governors are provided at the inlet of each set of coolers. Two out of three exhausters are always at work, and they provide the necessary pressure as far as the holder. Directly after the exhausters come the tar extractors. Though these differ somewhat in outward appearance from the usual construction, their method of working is the ordinary friction principle. Next come two rotary naphthalene washers, each dealing with one-half the make of gas. They are driven by specially erected steam engines. The arrangement is such that there is ample space for the later erection of cyanogen washers, if necessary.

When the gas has been freed from naphthalene, it passes to the apparatus which effects the ammonia recovery. This is where the first serious deviation from gas-works practice is to be found. Generally the gas is washed, and the weak ammoniacal liquor thus obtained is worked up to concentrated liquor or salt. But, in the direct process, the gas containing the ammonia is brought into direct contact with the acid bath in a saturating apparatus, which consists in a cylindrical metal vessel, funnel-shaped at the bottom. The apparatus is provided with a covering lid, and is lined throughout with lead. The gas enters by two inlets at the side, passes through a circular distributor, and makes its way out into the bath through numerous slits. In the top of the cover at the side is arranged the outlet pipe. In the middle of the cover is a steam and air arrangement for ejecting the salt.

In the Koppers process, the gas is warmed 20° to 25° C. before being passed into the saturators. Though warmth is set free by the reaction of the ammonia with the sulphuric acid in the bath, if the preheating were omitted the solution would become constantly thinner, and no salt would be obtained. Besides the loss by radiation, heat is necessary for evaporating the rinsings which re-enter the saturator from the centrifuge, for which the heat of the chemical reaction rarely suffices. The gas, passing through the slits of the distributing device in the saturator, streams through the liquor bath in numerous thin jets, and so comes into intimate contact with it. The ammonia combines with the excess of sulphuric acid as ammonium sulphate. As the bath is always kept in a saturated condition, the salt separates out in solid form, and collects in the funnel-shaped bottom. From here it is raised by means of the ejector already mentioned, and passes through a washing vessel into the salt pan. The liquor that is raised at the same time with the salt runs by an overflow into a vessel which is directly connected with the saturator, so that there is an uninterrupted circulation from saturator to salt pan, thence to the liquor vessel, and so back to the saturator. According to the consumption of acid, fresh supplies are added in the liquor vessel, so that the bath in the saturator is kept more or less at a constant degree of concentration. When enough salt has collected in the pan, the ejector is stopped, and the moist salt turned into a steam-driven centrifuge, in which the drying takes place. The liquor which separates out flows back to the vessel or to the saturator. The gas, as it leaves the saturator, flows by way of an acid separator to the second cooling plant, where it is reduced to normal temperature.

In the first condensers almost all water from the distillation of the coal is separated out, as well as the tar. In this water are also dissolved the so-called fixed ammonia compounds, such as the chloride. This liquor is separated from the tar in the pits as usual, and is then pumped to an overhead store-tank, or to the distilling apparatus. In the latter the ammonia is driven off in the usual way. The mixture of steam and ammonia then passes through a cooler, where part of the steam is condensed out, and thence back to the distilling apparatus. The fumes that remain are then mixed with the main coal gas before the inlet to the saturator, so that the ammonia left behind in the first condensers is recovered with the rest. The purification plant and other apparatus call for no special description, as they are of the ordinary most up-to-date type.

The actual advantage of the direct recovery process is that only a small proportion of the ammoniacal liquor needs to be distilled, so that there is considerable saving in the consumption of steam. Further, the whole of the ammonia of the gas, as far as is practically possible, is recovered as sulphate of ammonia. Besides this, the attention necessary for the whole plant is of the simplest, and the working is safe and clean, since the whole of the process is practically mechanical.

The death occurred on the 27th ult., at "Stoneleigh," Eastern Avenue, Reading, of Ellen Maria, widow of Mr. Edward Edmund Baker, who was for many years Engineer and Manager of the Reading Gas Company, and who died early in 1905. Deceased lady was in her seventy-seventh year.

The Mayor of Reading (Mr. C. G. Field) has presented Mr. Thomas Aitken, the foreman at the Tilehurst Water-Works, with a cheque for ten guineas from the Carnegie Hero Fund, for a conspicuous act of bravery in rescuing Mr. George Lowthian, the Consulting Engineer of the Tilehurst, Pangbourne, and District Water Company, Limited, who fell down the well at the works. The accident was recorded in the "Journal" for Oct. 15 last. The Mayor congratulated Mr. Aitken on the heroism he displayed, and said the town was proud of such men. Mr. Aitken recently received a medal from the King for his gallantry.

Mr. F. O. Oertel, the Superintending Engineer to the Allahabad United Provinces of Agra and Oudh, has forwarded a copy of the notes made by him on the inspection of some multiple filter installations on the Puech-Chabal system while on leave in Europe. The inspection was made at the suggestion of the Hon. W. G. Wood, the Chief Engineer and Secretary to the Government, with a view to the introduction of similar installations at Allahabad, Benares, and elsewhere. The places visited by Mr. Oertel were Magdeburgh, Cherbourg, Suresnes (Paris), Roubaix and Tourcoing, York, the works of the Derwent Valley Water Board at Bamford, and those of the Metropolitan Water Board at Kempton Park, Sunbury. The author was particularly careful to ascertain on the spot the results of the operation of the filters; and he found that at all the works visited they had given satisfaction. The conclusion he arrived at was that these filters are specially suited for water supplies from turbid rivers.

GLOVER-WEST VERTICALS AT BRIDGWATER.

Inauguration Ceremony—Presentations.

Last Thursday, an interesting ceremony took place at the Bridgwater Gas-Works, in the presence of an influential local representation, and also of a large number of gas engineers from the South-West district. The last-named class were so much in evidence as to give a decided Gas Managers' District Association meeting complexion to the gathering. At the invitation of the Chairman and Directors, the Mayor of Bridgwater (Mr. R. O. Sully), Alderman F. C. Foster, Alderman W. Thompson, Mr. F. Parr (Borough Surveyor), several directors of neighbouring gas undertakings, and the other visitors assembled at the works at half-past two. Among the gas engineers and managers present were Mr. H. Alley (Wells), Mr. H. B. Chamberlain (Trowbridge), Mr. J. Hughes Cornish (Bridgwater), Mr. Dawson (Paignton), Mr. D. Garlick (Glastonbury), Mr. J. H. Gray (Weston-super-Mare), Mr. F. Farrand (Ryde), Mr. Norton H. Humphrys (Salisbury), Mr. J. J. Jervis (Swindon), Mr. C. Jefferies (Tiverton), Mr. C. Foster (Exmouth), Mr. J. H. Gray (Teignmouth), Mr. F. Osmond (Dorchester), Mr. P. Thomas (Wellington), and Mr. H. F. Vincent (Frome). Notwithstanding the late period in the year, the immediate vicinity of quarter day, and the special attraction in London during October, the attendance of so large a professional representation may be taken not only as a token of interest in the Glover-West system of vertical retorts, but of the general respect and esteem entertained for Messrs. Cornish, father and son, who have for 65 years been identified with the fortunes of the Bridgwater Gas Company. And it is no detriment to Messrs. Glover and West to say that many of the older visitors attended not only to see the new installation, but to have an opportunity of shaking hands with Mr. Cornish, senior. The entrance of this gentleman into the works, punctual to time, and stepping out briskly, in spite of the burden of eighty odd years, was the signal for a hearty expression of approval and greeting; and it may be added that he participated in the whole of the proceedings with the same kindliness and good fellowship that were such an attractive feature when the old South-West Association met at Bridgwater to greet him as the President some 25 years ago.

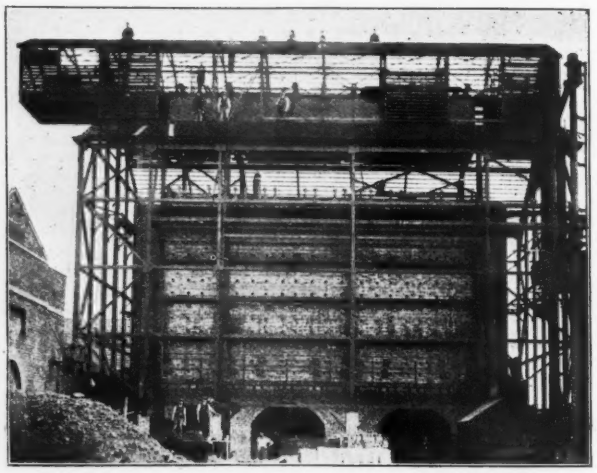
The whole of the plant and the buildings have been erected by West's Gas Improvement Company, in accordance with plans prepared by Mr. J. Hughes Cornish; and the Sub-Contractors were Messrs. H. W. Pollard and Sons and Messrs. Ashton and Sons, of Bridgwater. The Contractors were represented by Mr. Fred J. West, Mr. Frank West, Mr. Kennedy, and Mr. P. C. Shapley. The work comprises a substantial brick building, 67 feet long by 40 feet wide, and some 80 feet high, containing, in one block, two beds of eight and one of four retorts—twenty in all—and half of each bed can be shut off, if required by the exigencies of demand. The productive power is 500,000 to 600,000 cubic feet of gas per day; and the whole of it can be kept going by two workmen. It will be equal to the entire requirement, and will displace the old retort-house. As several installations on this system have already been fully described in these pages, we need not here repeat the details, but may incidentally mention that the Bridgwater Gas-Works are situated on the bank of a river, and subject to floods; and that they have had the undesirable experience of the generator pits being completely filled to ground-level more than once within a twelvemonth. A high-water mark was exhibited in the retort-house, at about 3 feet above floor-line; and the new apparatus is all well above this datum. It is therefore expected that interference with operations by flood is now a thing of the past.

The party having assembled in the new building, the Chairman of the Gas Company (Mr. R. Y. Foley, J.P.) expressed the pleasure experienced by himself and his colleagues at the presence of so large and influential a gathering, and proceeded to compliment the contractors on the very efficient way in which the work had been carried out, without interference with the daily routine, and without any hitch or accident. He included in this expression every man, from the highest to the lowest, who had been concerned in the work.

Mr. Foley then started the coal-elevator, and later delivered a charge of coal into one of the retorts. The party next proceeded to the discharging shoots, to witness the withdrawal of a few barrowloads of coke. This came out quite cold enough to be taken direct to the tip, and pieces were passed from hand to hand for inspection. It will be remembered that a feature of this system is that the heat of the spent charge is transferred to the secondary air supply for the producers. The visitors were then invited to divide up into small parties, each of which was taken in hand by a guide; and in this manner the principal features of the system were fully explained and exhibited to all—great assistance in this direction being afforded by samples of the principal working parts and an excellent series of drawings. The professional visitors, of course, extended their inspection to the other parts of the works, where they found much to interest and to instruct them.

At the conclusion, the party assembled in the yard, and after being photographed proceeded to an adjoining parish room, at the invitation of West's Gas Improvement Company. This was found to be prettily decorated with plants and evergreens, and a *recherché* "high tea" was awaiting the visitors. Mr. Foley occupied the chair, and was supported by the Mayor of Bridgwater, Mr. Fred J. West, Alderman Foster, Mr. Parr, and Mr. J. Hughes Cornish. The Loyal Toast having been duly honoured,

The CHAIRMAN proposed "Success to the Vertical Installation." He repeated his welcome to the visitors, and said that for the design of the buildings they had inspected that day the Directors were entirely indebted to their Engineer and Manager, Mr. J. H. Cornish, who had no easy task in setting out such a high structure. As it would be quite a landmark in the district, they had endeavoured to give it a pleasing appearance; and he congratulated Mr. Cornish on the result. [Applause.] Unfortunately, the installation meant the displacement of several men—some old servants; but through the exertions of Mr. Cornish, employment had been secured for them elsewhere. The apparatus had actually been in operation for nearly a month, having been started on the 9th ult., and, under the guidance of Messrs. Shapley and Kennedy, was being worked by their own men without difficulty. He understood from Mr. Cornish it was showing an additional yield of 1500 cubic feet of gas per ton of coal. The Bridgwater Gas Company were started in 1834, with a capital of £5300, and at the present time they held powers to issue £122,000, of which they had raised £60,000. A great piece of good fortune befell them in 1859, when Mr. J. H. Cornish entered their service; and he doubted if many undertakings could show such a remarkable record. After 55 years of faithful and devoted service as Secretary, Mr. Cornish retired nine years ago, in favour of his son, but immediately joined the Board, and still afforded valuable assistance as a Director. He could therefore show 64 years of service. He believed Mr. Cornish's grandson was also with them that day; and so between them they might, and he hoped they would, account for 150 years in the service of the Company. [Laughter.] The starting price of gas was 15s., and when Mr. Cornish joined the Company it was 6s. 6d.; but it was now 2s. 7d. to 3s. per 1000 cubic feet. In concluding, he acknowledged the courtesy extended to Mr. Cornish, the present Engineer and Secretary, by various gas engineers and managers in the course of his inquiries preliminary to the adoption of the Glover-West system.



The Glover-West Retort-House in Course of Erection at Bridgwater.

Mr. F. J. WEST responded to the toast, and said that his Company had put down fifteen plants comparable with Bridgwater. He congratulated the Bridgwater Gas Company on their enterprise, emphasized the need for working on enterprising and progressive lines, and strongly recommended all who had not already done so to join the British Commercial Gas Association. His firm greatly appreciated the courtesy and kindness they had received at Bridgwater; and in proposing the health of the Chairman and Directors, he asked the Chairman to accept a memento of the present occasion, and hoped he would long be spared to preside over the affairs of the Company. [He then handed the Chairman a handsome silver salver.]

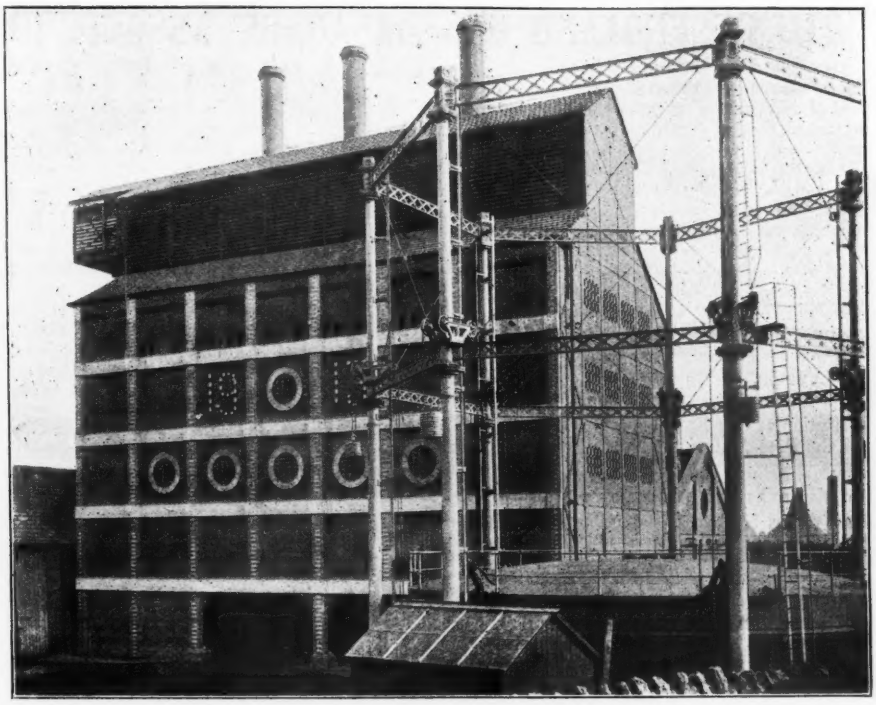
The CHAIRMAN having suitably replied,

Mr. J. H. CORNISH, jun., proceeded to relate in detail the advantages that commended the Glover-West system to his attention, after inspecting it in operation in England and on the Continent. He spoke highly of its smoothness in working, the excellent and uniform quality of the gas produced, and absence of soot, smoke, and flame.

The MAYOR, in proposing "Success to the Bridgwater Gas Company," said he was pleased to see such a large representation of what he might call a thriving and prosperous industry, and to give them a cordial welcome to the ancient borough. The gas industry, he thought, was second to none in the way it had developed, prospered, and progressed during the last century. He could not imagine that any Mayor of a city or borough could look with indifference on the extension of local industries. The relationship of the Gas Company and the Corporation had always been of the pleasantest character. [Applause.] Referring to the importance of public lighting, he expressed the opinion that the incandescent burner was the best agent for this purpose.

Alderman FOSTER, in acknowledging the compliment, said the Directors desired to be in the van of progress, and to manufacture the best article at the lowest cost. He alluded to the numerous improvements lately introduced, not only for lighting, but for cooking and heating by gas, which had the effect of largely increasing the demand. He thought a gas-cooker in a house was one of the best means of promoting domestic felicity. He joined in congratulating West's Gas Improvement Company on the way in which their contract had been carried out, and the successful issue of their labours that day, and concluded by proposing the toast of "The Visitors."

Mr. F. PARR, in replying, said that, though at one time he favoured



THE GLOVER-WEST VERTICAL RETORT-HOUSE AT THE BRIDGWATER GAS-WORKS.

electricity for public lighting, he now regarded gas as the best for the purpose.

The CHAIRMAN said they had wished to present to Mr. John West, the head of the firm, something that would remind him of his connection with Bridgwater; and he now had the pleasure of requesting Mr. Fred West, on behalf of his father, to accept an oak chair, carved from some old oak taken from St. Mary's Church during restoration, by a burgess of the town, Mr. C. H. Baker. This was given with their best wishes for the success and prosperity of the firm, and best thanks for the successful completion of the contract.

Mr. FRED WEST returned sincere thanks for the handsome present, and regretted his father was not there to receive it himself.

The Editor of the "Co-Partnership Journal" of the South Metropolitan Gas Company offers his congratulations, in the current issue, to Mr. W. J. Dees, a district foreman, on getting the full Technological Certificate in "Gas Supply." Mr. Dees obtained the first class in Honours two years ago, and has since passed in the qualifying science subjects. He has also passed in the final grade of plumbers' work and in Grade I. of "Heating and Ventilating."

At the offices of the Tonbridge (Kent) Gas Company last Tuesday, Mr. J. H. Donaldson, the late Assistant Manager, was presented with a handsome marble clock by the staff, on his leaving to take up his duties as Engineer and Manager of the Sevenoaks Gas Company. Mr. Batchelor, making the presentation, said the staff had always found Mr. Donaldson open and straightforward in all his dealings. They were all proud of his attainments, and hoped he would eventually become one of the leading lights of the gas industry. Mr. Mackley endorsed these remarks, and spoke of the cordial relations which existed between the management and the staff. He expressed the wish that Mr. Donaldson might be as successful at Sevenoaks as he had been during his connection with the Tonbridge Gas Company. Mr. Donaldson, in reply, said he appreciated very much the kind words which had been said, and also the beautiful clock, which would always remind him of the ten happy years that he had spent with the Company.

The "Croydon Co-Partner" for the current quarter contains an interesting reminiscence of the early days of the Croydon Gas Company. There is given as a supplement a portrait of Mr. Henry Overton, a native of the town who took a prominent part in many of its commercial activities. His father's house adjoined the site of the original gas-works, which were erected by Messrs. Barnard and Defries about the year 1827. They came into the market two years later, and were purchased by Mr. Overton for about £1000. They remained in his possession and under his management for seventeen years. During this time, the town grew rapidly in size and importance, and many extensions of the works, consequent upon the increased demand for gas, were carried out. In 1846, a movement was made by a number of gas consumers for the formation of a company; and it was decided to make an offer to Mr. Overton for his works. These were eventually purchased for a sum equal to £7000; the vendor retaining a large interest in the undertaking. On the incorporation of the Croydon Commercial Gas and Coke Company on July 2, 1847, Mr. Overton became one of the first Directors, and held the position till his death in 1864.

MANCHESTER JUNIOR GAS ASSOCIATION.

First University Lecture of the Session.

About forty members of the Manchester and District Junior Gas Association were present at the Manchester University on Saturday afternoon, when the first of the series of lectures which has been arranged by the Council for the current session was delivered.

The chair was occupied by Principal J. W. GRAHAM, of Dalton Hall, Manchester, who in a few words introduced the Lecturer, Mr. F. D. Marshall, M.Inst.C.E., of London.

The CHAIRMAN remarked that it was always a pleasure for him to have anything to do with questions concerning low-temperature distillation. Some of the members present would doubtless recollect that he referred to the subject in the course of the lecture he delivered last March on the "Hygienic Aspects of Gas,"* so he would not now refer to the matter at length. He was glad they had in their midst that afternoon a distinguished engineer in the person of Mr. F. D. Marshall, who was an expert, and who would tell them what was being done on a commercial basis in regard to smokeless fuel. The present-day foul atmospheric conditions would never be satisfactorily overcome until a solid fuel was obtained which would make very little smoke. He (the speaker) thought gas engineers should concern themselves not only with the production of gas, but the discovery of a smokeless residual which contained more volatile products than they had yet had. Their lecturer was engaged in the business of producing the low-temperature and tarless fuel to which he had referred, and his contribution to their proceedings would be an extremely valuable one.

Mr. MARSHALL then delivered his lecture, which will be found on pp. 50 54. A conversational discussion followed, a report of which will appear in due course.

After the lecture, tea was provided in the College Refectory. At its conclusion,

Mr. J. TAYLOR (Mossley) opened an informal discussion on "Coke: The Furtherance of its Use as a Fuel for Domestic and Industrial Purposes;" and the President (Mr. W. L. Heald, of Preston), with Messrs. R. Dagg (Farnworth), A. L. Holton (Manchester), S. Carter (Garston), J. Murgatroyd (Bury), W. Parker (Bolton), and J. Bridge (Stretford) took part in it.

* See "JOURNAL," Vol. CXXI., p. 598.

At St. Margaret's Church, Westminster, on Thursday last, the marriage was solemnized of Lieut. Frederick A. Buckley, of H.M.S. *Excellent*, son of Mr. J. W. Buckley, M.Inst.C.E., the Engineer and Manager of the Hornsey Gas Company, and Mrs. Buckley, of Crouch End, and Miss Eva Godskesen, only daughter of Dr. and Mrs. Godskesen, of Copenhagen. An unusual sight was witnessed after the ceremony, when the sailors from the bridegroom's ship, who were present to form a guard of honour, dispensed with the motor, and obtained a carriage with ropes attached, and dragged the wedded couple from the church to their hotel.

NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.

The Seventy-Third Half-Yearly Meeting of the Association was held on Saturday afternoon in the Chemistry Lecture Theatre of Armstrong College, Newcastle-on-Tyne. The President, Mr. ERNEST F. HOOPER, F.C.S., was in the chair; and there was a large attendance.

INSPECTION OF COLLEGE BUILDINGS.

Prior to the transaction of business, the members were shown over the College buildings, together with the new Art Department and the Agricultural Department (the latter nearing completion), by Mr. F. H. Pruen, the Secretary of the College, Professor Bedson, Professor Louis, and other members of the staff.

LETTERS OF REGRET.

Letters of regret for absence were read from Mr. E. Allen, the President of the Institution of Gas Engineers, Mr. W. Doig Gibb, and Mr. David Vass, the President of the North British Association of Gas Managers.

NEW MEMBERS AND ASSOCIATES.

The HON. SECRETARY (Mr. Herbert Lees) submitted the names of the following candidates for membership:—

Members.—Mr. Henry Cavaghan, Wigton, Cumberland; Mr. Thomas Alfred Seagrave, Corbridge Gas Company.

Associates.—Mr. Christopher Fraser Barrow, Sunderland; Mr. Alfred Coates, Whessoe Foundry Company, Darlington.

On the motion of the SECRETARY, seconded by the PRESIDENT, the nominations for membership were agreed to.

ARMSTRONG COLLEGE LECTURES.

The SECRETARY announced that, in connection with the Newcastle Section of the Society of Chemical Industry, five lectures on the Utilization of Fuel would be given at Armstrong College by Professor Cobb, of the Leeds University. The tickets for the course were nominally 10s. 6d.; but members of the Association were permitted to enter for the course at half fee. He had some tickets to dispose of at 5s. 3d. each for the five lectures; and hoped many would take advantage of them.

Mr. HOOPER then delivered the following

PRESIDENTIAL ADDRESS.

At this, my first opportunity of addressing the Association as its President, may I express on behalf of the bye-product industry a deep sense of the appreciation which has led you to invest one of its adherents, outside your own rank of membership, with the honour appertaining to its presidency? It is a distinction of the more value owing to its rarity. And, secondly, from the personal aspect, may I look upon it as a friendly tribute from those with whom, for nearly a score of years, it has been my privilege to have close relationship in educational, business, and social aspects? It is my greatest desire that, during my tenure of office, the high past traditions of our Association may remain unimpaired, and that we may progress further, still adding our quota as pioneers of light and power, not only in our North-Eastern District, but wherever science and civilization lead.

As to the subject-matter which my address should include, in reviewing the form most of our presidential addresses have taken, I note that they may be classified generally under two heads: Either a technical or executive experience, or a review of what has taken a noteworthy place in the gas industry for the preceding year. It might not be out of place here to remark that in no technical industry can I imagine keener interest being evinced in every point, from the raw materials received to the products sent out, than in the gas industry.

THE GAS INDUSTRY AND THE PRESS.

The members of the industry are served in an invaluable manner by a highly critical and educated Press; and the engineering staff as a whole have little reason to complain of the widely-circulated information always available, not only in their splendidly compiled hand-books, but also in the current Press, which enables engineers and others to keep fully alive to all patents taken out, not only in this country but in other countries also. This should manifestly tend to a very high state of efficiency in all departments. These factors contributing to the welfare of the industry are of immense benefit to the manufacture of gas as a whole, and consequently the public, in a subsequent, but no less important, degree. These facilities are probably unequalled by any other large industry in existence. This may be accounted for to a large extent by remembering that the industry as a whole is not commercially competitive in the sense that many manufacturers and trades are bound to be. Consequently, rivalry takes a more friendly aspect, and the competition is mainly one of emulation—one works vieing with another to show better methods of working than the other, as well as lower costs and better profits, which in most cases means cheaper gas to the consumer and better dividends to the shareholders of the respective companies.

If any phase of the industry could be cited, from the delivery of the coal or oil to the final output of products, every point possible seems to have been exhaustively touched upon, not once but often, by different technologists, and in many cases from a different standpoint. These several aspects are bound to be considered, as practices must necessarily vary largely with the size of the works, the locality, and the host of various considerations which managers and engineers can only well appreciate.

SMOKE NUISANCE—CONSERVATION OF COAL.

The same principle guides the office control, and the factors of capitalization, taxation, depreciation, advertising, and the sale of products by different methods and scales are all dealt with from time to time in most cases in a masterly manner. With such resources, the decay and fall of the gas industry is not yet—indeed, with an advanced public opinion being rapidly educated, better illumination is continually being called for, and the smoke problem may largely be solved here and now by the wider adoption of smoke preventing heat appliances. According to Dr. Rideal, London enjoys the precipitation of no less than 76,000 tons of soot per annum—averaging several hundred tons of soot and dust per square mile per annum. I have carefully avoided comparing Newcastle and district under similar conditions; but one may be permitted to remark that the gas industry at any rate has this to its credit, that if gas were not so extensively used the figures, both in London and elsewhere, would be much worse. In fact, it resolves itself into more gas, less smoke.

Is it not worth hoping and working for with all energy that the gas industry in years to come may solve the problem so near the heart of all well-wishers of humanity, in dispelling the horrible smoke pall which for generations has defiled our cities, polluted the air we breathe, soiled our homes, shortened the lives of our town dwellers, and screened the blessed sunshine from the children, to whom pure light and air are essential for a healthy and happy upbringing?

At the risk of labouring the question, we are furthermore endeavouring to achieve one of the most beneficial acts possible to mankind now and in the future, by attempting to conserve the naturally magnificent resources of the country of which we are the happy inheritors. In the midst of prosperous times now, we should not forget that it is our present bounden duty to hand down to our descendants the best possible conditions; so that they, in their turn, may not suffer from our—shall I say—ignorant prodigality. Is there not a tendency nowadays to look on coal and water as two necessary materials of some equivalent character, produced by Nature, for which we pay in some ratio? We are liable to forget that water is practically indestructible; but every ton of coal used is an expenditure of our national capital wealth. There is probably no question of greater moment before us as a nation than the proper husbanding of our natural resources. The word "economy" seems to be a by-word at the present time—shall I say politically as well as socially? There are those, however, who feel that, as our forerunners have worked to bring posperity to us, it is our bounden duty to forecast the needs of posterity, even though it may appear prejudicial to our present personal interest.

BYE-PRODUCTS.

It might appear to the point, in view of the industry to which it has been my lot to be allied, if I were to address you more directly from the purview of the bye-product trade, especially that side of it with which I have been more closely connected and familiar than most of my audience. On reviewing the situation, however, I find little fresh matter to add to my previous communications before you, or those which I have given elsewhere, the records of which are easily available to those who desire information on this head. May I also remind you of the fact that the last President you elected outside your own profession (I refer to the late Sir Samuel Sadler) gave as his address, in his own inimitable manner, a review of the bye-product industry—a masterpiece of wisdom garlanded by such delightful humour that it still remains to us as a most excellent literary souvenir?

It consequently appears to me, apart from a few general remarks, which I will deal with in order, that if I may trespass on your patience for a while, I would desire for once in the time allotted to me to try and act the often cruel part of a candid friend. This friend may at times very well be deemed the unhappy person who steps in where angels fear to tread. But if for the time being I may be deemed to be outside the gas industry, I trust the licence I am allowing myself may not call down on my head vials of wrath, while I try to indicate a few factors possibly occurring to an outsider, which may afford some food for quiet reflection and consideration.

At the outset, I propose to consider the gas industry as a large chemical trade, probably the largest in the kingdom, which serves many most important purposes, among which may be included: The lighting of public thoroughfares and private dwellings, the heating source of public and domestic buildings, also supplying power for many different trades and technical purposes. It can also produce smokeless or slightly flaming coke fuel, large quantities of artificial manure, ammonia and its salts, and the supply of raw material to the tar distiller. Of recent years tar products have largely been the salvation of the highways, both as regards texture and surface as well as the prevention or diminution of the abominable and dangerous dust nuisance. Beyond this may

be mentioned the production of moderate quantities of sulphur and cyanide bodies which have their obvious utility.

GAS UNDERTAKINGS AS COLLIERY OWNERS.

In many factories coal is a very material requisite, mostly used for steam-raising purposes. With the gas industry, the problem of supplies and the cost is of vital interest and moment. From time to time the high price to which coal has advanced causes inquiries to be made into the methods of the coal trade; and it has been suggested that some of the larger gas companies should buy and work their own pits. Looking at the question broadly, taking the experience gained from colliery balance-sheets, the subject is a very important and debatable one. Firstly, taking the working results of a colliery over a period of years, which, of course, is the only fair way of estimating its value—the period should not be less than a decade—one arrives at the net and gross profit. Many important points arise requiring the closest consideration. Would a gas company be prepared to risk the vast necessary capital in securing mineral rights, boring, sinking shafts, providing the expensive plant, making railroads, and shipping facilities, when one has to consider that over and above this the capital outlay may be idle for many years before any material return can be obtained? Secondly, there is the ever-present risk of the original capital being quite insufficient to complete the opening of the pit properly, owing to unforeseen trouble—such as running sand, faults, varying composition of the coal in different seams, and many other lesser factors which go to make coal-winning a hazardous speculation, sometimes undoubtedly very profitable, and at times very much the reverse.

If the proposition was accepted that a colliery in full working order should be purchased, would the price required not be such as to largely submerge the additional chance of cheaper coal? The only way, apparently, such a scheme could be worked would be by several gas companies joining together and taking an interest in a well-established and not too old colliery. This is a matter possibly worthy of consideration. It may well be a question for dispute as to whether a reasonably capitalized gas-works, well managed, does not give an equal return on its capital to an average colliery, with a very much lower hazardous risk over a period of years, because it must be remembered that the life of a colliery is by no means indefinite.

The outlook as regards coal supplies, if one may venture to speculate, would lead one to look to the future (unless some new mechanical devices can materially lower the cost of winning) for high prices, not necessarily using the term on (say) to-day's figures, which may be deemed somewhat abnormal.

As to the trend of costs, the charge for labour and everything affecting coal mining is being raised, and he would be considered unwise who thought the limit had by any means been reached. Owing to the increase in the price of commodities, the rise is not abnormal, and may go still farther. Almost every building material, as well as plant, has recently been raised in cost of production; and it is improbable that, even with a set-back in trade, which is bound to come sooner or later, the low-water mark of wages and cost of material may touch the low prices of past experiences.

These facts increasing the responsibilities and care of those controlling gas-works have been to a certain extent neutralized by closer attention to working costs, as well as the installation of economies, and by the higher prices of residuals, without your officers having to resort to the unsatisfactory and last recourse of raising the price of gas to the consumers.

SULPHATE OF AMMONIA.

The sulphate of ammonia trade has had a long spell of prosperity, and heavier production has not lowered prices, showing a healthy demand for this fertilizer. Strangely enough, however, the advantageous use of this salt as an artificial manure seems to be made less use of in the United Kingdom than in most European countries, and even some Continental ones—despite the more than useful work done by the Sulphate of Ammonia Committee.

TAR AND BENZOL.

The tar trade has gone through strange experiences of late years. Not long ago, many of us either had begun, or were about, to burn creosote oil as a fuel; its value being so poor, and proportionately as cheap as, or cheaper than, coal. At the present time, not only England, but Europe, cannot satisfy the American demand for this oil for timber-preserving purposes; and this call for oil in the United States alone is not likely to be satisfied for a long time to come. Again, the briskness of the coal trade, more especially in Europe, has sent pitch up to what may be considered a relatively abnormal figure, taking the price averaged over a period of years; and as long as the trade of the world as a whole continues brisk, high prices are likely to continue. Benzol has at last become recognized as a valuable motor spirit; and with better means of distribution, it is likely to be a material asset to bye-product coke-oven owners and tar distillers. Quite recently some interesting useful bodies have been prepared as condensation products of phenol and cresol, known commercially as "Bakelite" and "Resinite." The discovery of these bodies may be of material value in connection with the tar acids found in coke-oven and gas-works tar. All this enhanced value from the major tar products has been reflected in the price received for the raw material.

CYANIDE RECOVERY.

It may be fairly questioned whether a really good method is as yet devised for the abstraction of the cyanides from gas liquor, though this can only at best be a small side-issue in the manufacture of gas. There are, nevertheless, circumstances arising which must necessitate the gas industry continuing to bestir itself to guard all points in order to retain its proud position as the dominating lighting and heating factor of our present civilization in this country. Towards this end, the seed sown by establishing a chair of "Gas Technology" at the Leeds University should, in the current and future years, yield most valuable data on the many points of vital interest which, as far as I can gather, are at the present time wanting. One is struck by the wide expanse of technology which the industry covers, embracing the strength of a variety of materials, including those of a refractory nature, as well as metal, and the physical problems appertaining to horizontal, sloping, and vertical retorts; the design of foundations; the purification of the finished products; the preservation of steel work and the use of ferro-concrete; the analyses of coal and its calorific and illuminating value; the constitution and condensation of gas, as well as its enriching and distribution; the ultimately best form of burners for lighting and heating, as well as for technical purposes. All these points require much careful and scientific investigation.

WORKS SITES.

Turning to the works themselves, it appears advantageous, if possible, to erect them outside the immediate area of the town; one reason being the probability of getting cheaper land, and to allow of reasonable expansion. Also such a situation might be well considered to induce some industries to take up adjoining ground, where a good gas supply, probably a day load, would be used. Such trades as japanning, enamelling, drying, forging, annealing, laundering, biscuit-making, and many other trades might be instanced. Gas could be supplied to such works on the best possible terms. A fair sliding-scale would probably be mutually beneficial. It must always be borne in mind that gas-works are put down primarily as dividend-earning propositions; but I think we have something to learn from some of our Continental friends in the artistic designing and erecting of works. Many of our gas-works are not beauty spots, and a little judgment and thought spent in designing and building them would be amply repaid by the public appreciation of a works of pleasing appearance.

COAL ANALYSES.

A few words on the analyses of coal. It has been brought very closely to my notice during recent years that Continental buyers and consumers of coal are bringing a great deal of scientific investigation into their acquisition of this product. Some of the most complete information as to ultimate analyses, calorific value, and gas-producing qualities of Durham coal, not only from various pits, but from separate seams, came to me from, and were prepared by, a technical professor at Riga, with whom I became intimate when he was on a visit to England to attend the International Chemical Congress. This as a solitary instance points to the fact that users of coal on the Continent are able to pass a shrewd judgment as to value when coal is offered. I understand also that in America a great deal of the sale of coal is conducted on the results of analyses. While one may reasonably assume that our engineers have a fair knowledge of the capability of the coal they admit to their works, it might well be considered whether further information, such as it appears is largely obtained on the Continent, might not often come to the aid of a buyer at home, and save him something financially as well as technically.

COKE-OVEN GAS.

Without treading too closely on what must necessarily be very debatable ground, it is probably well known to many of you that several Continental towns are now being mainly, if not entirely, illuminated by means of coke oven gas. This naturally applies to areas of population reasonably adjacent to the bye-product ovens. If my information is correct, already one town, if not more, on our own North-East coast is adopting a similar scheme. The question of uncertainty of production appears to me to be the main argument against the principle of the use of coke-oven gas. Otherwise many gas companies running near to the limits of their production with present plant, in the vicinity of bye-product ovens, might well consider the oven gas as a welcome auxiliary to their own supply, as there would be no serious obstacle to its being associated with a normal gas-works output. In this district, as you are no doubt all well aware, much of the coke-oven gas is already being used to generate power, which is, at the present time, being utilized for the production of electricity.

REFRACTORY MATERIAL.

There has been a good deal of discussion lately on the quality of refractory materials, as made both at home and abroad. I am unable to speak definitely of the results of the Refractory Materials Committee which was appointed among several scientific societies some time ago. But many points appear to be of great interest to gas engineers on which useful information is required, not only in the gas industry but in others also. The possible lining of the interior of the retort with some highly infusible coating material, which would tend to make the retort less porous, and which might also be of assistance in preventing the heavy graphitic carbon

deposit (which cannot but interfere with the life of the retort) would repay investigation. It would be reasonable to assume that the result of the carbon deposit within the retort has been produced by gas being decomposed into its lower elemental constituents—probably by the high temperature of the interior of the retort walls. Can this be in any way avoided? I believe the use of vertical retorts seems to tend to a lower percentage of deposited carbon.

COAL LIMING.

From time to time some considerable number of discussions have taken place regarding the part played by lime if mixed with the coal when heated in the retort—especially in relation to the percentage of nitrogen actually obtained from the coal. This point is worth developing very fully, not only as to whether material advantages may be obtained in nitrogen yield and in the condition of the coke produced, but it also seems quite feasible that the introduction of certain materials along with the coal might be found of benefit in the production of gas and residual products.

AMMONIA YIELD.

Most of those present will join with me when I suggest that the yield factor of ammonia in gas manufacture is most erratic and often disappointing. It is well known that the highest ammonia yield does not coincide with the best all-round gas yield. When it is appreciated that gas coal yields in many cases by ultimate analyses up to 2¼ per cent. of nitrogen, or a theoretical yield per ton of coal of 200 lbs. of ammonium sulphate, it is to be confessed that an output of 20 to 30 lbs. of sulphate of ammonia per ton looks at least shabby, even when allowing for the nitrogenous bodies in the tar, as well as the nitrogen left in the coke. It would appear that much might be done, by very careful watching of the washing and scrubbing plant, to improve results in this direction. Ammonia, as usually dealt with in gas-works, must be looked on as a very volatile and fugitive body; and, unless hermetically sealed in every direction, it will disperse very rapidly, especially if the aqueous solution is anything but cold. Leakage is often not perceived until the smell of the adjoining ground, largely saturated, at last calls attention to the waste going on. I believe close watching and careful attention from the laboratory might lead to some most useful improvements.

PURIFICATION.

Recently a good deal more attention has been paid to the process of purification. The methods, however, have altered but slightly for a long period of time; and one might well conceive new methods of purification which might supersede the general lime and oxide of iron treatment now in vogue. Work has been done lately with a view to decomposing carbon bisulphide by contact with heated surfaces, whereby this objectionable constituent is broken-down to sulphuretted hydrogen. Of this process probably more will be heard. Another purification process by means of alkalinated cellulose also promises possibilities in a different direction. As both these processes have been dealt with in the Technical Press, their progress will no doubt be carefully watched by gas technologists as a whole.

I would suggest that a distinct step forward could be claimed when a wet process can be introduced—especially of a cyclic character—thereby avoiding the removal of purifier lids and the labour due to revivifying, as well as the disposal of spent oxide, which is already a drug to most works, with the exception of those where sulphuric acid is being made. Few would lament the non-production of gas lime—by no means a pleasant factor in the industry. If some farmers desire continuous supplies of this delectable product, no doubt it could be produced for their benefit at a reasonable figure.

SURFACE COMBUSTION.

A proposition worthy of the fullest consideration has recently been brought before us by the remarkable work done by Professor Bone in his valuable researches on flameless combustion. The time for steam raising for power purposes is not yet over; and, although competition may arise in this type of work by gas producers, suction-gas plant, and the like, yet coal gas as the working agent has not yet spoken its last word. Everything possible, therefore, should be done to foster and follow up this new phase of procedure, which is surely yet in its infancy.

MOTOR FUEL.

With the great advance made during recent years in mechanic a traction, one of the products of the industry is already playing a conspicuous part. I refer, of course, to benzol. On the other hand, there is a point well worthy of attention in the use of coal gas itself as a motor fuel for internal combustion engines; and I would suggest that gas stored under pressure is by no means an impossible proposition. Under proper control, it would appear, from experiments carried out, not only in this country but also in France, that there is quite a field open for investigation, especially regarding large commercial vehicles. Containers, in the form of tubes such as are used for dealing with other gases, are easily obtainable; and from data already made public coal gas can be used competitively with spirit in the driving of the heavier classes of vehicles.

A well-known gas engineer from across the water recently propounded a scheme while in this country. It was for washing the gas and obtaining therefrom a considerable quantity of benzol bodies for motor spirit purposes. The idea was one which, while bold, could hardly be considered as original. It was a pity he could not remain longer on this side to admit of discussing his scheme fully with our engineers. It is naturally quite easy to remove the lighter hydrocarbons; but of what illuminating and calorific value will the gas be when thus treated? It stands to reason that some ingredient must be added to make up for the loss; but where is this ingredient, and at what price can it be obtained? If a lower candle power were allowed—and this is not at present a likely proposition—the gas would have to be sold at a considerably lower figure, or a very much larger quantity be allowed to yield comparative results. This, at the outset, does not look like a profitable experiment. Is anyone prepared to show how the idea can be profitably worked?

LOW TEMPERATURE CARBONIZATION.

Dealing next with low-temperature carbonization. For years past experiments on many scales have been made, and in many directions, to distil coal under conditions somewhat different from those that appertain in general gas-works practice. I do not propose too critically to examine the various processes which of recent years have been subject not only to much debate and criticism in many directions, but which, unfortunately, have been, through unhappy financial arrangements, most unsatisfactory in their results. We may give some of the pioneers credit that, at any rate, their desire has been to produce a better state of atmospheric conditions by means of smokeless fuel, in place of the ordinary smoky coal-fires. Although so far success has not been altogether attained during the past year, owing to the great appreciation in the value of volatile oils and spirits, the problem of low-temperature carbonization has become decidedly more attractive.

A vacuum process has recently been installed in London, and the figures submitted on behalf of the Company dealing with the problem, published by a gas expert whose name is a household word in the industry, demand very careful attention. So far, I would submit that gas engineers have worked on the line of the highest and best gas output, irrespective of bye-products per ton of coal carbonized. In connection with the possible distillation of coal at a low temperature, and under reduced pressure, it has been indicated that 15 to 20 gallons of coal oil can be produced per ton of coal. By means of cracking part of the resulting oil, some 5 to 10 gallons of spirit suitable for motor purposes can be obtained. This in itself indicates that, as there is an ever-increasing demand for suitable motor spirit, much may be done in this direction to produce a good home-made spirit. As is no doubt realized, high temperature carbonization does not yield much hope in the direction of this condition of affairs, owing to the stability of many of the hydrocarbons produced under these conditions.

ECONOMIC CONSIDERATIONS.

Has not the time arrived for our engineers and chemists to consider very fully whether the best economic results are compatible with a maximum good gas supply and a minimum of attention to the bye-product possibilities? It is well within the bounds of possibility that we have reached the turning point in the industry, and that a lower gas yield per ton, with a corresponding improvement in bye-products, may not be a sign of further progress.

If one were to give oneself considerable licence in discussing the engineering points in constant consideration in a gas-works, it might be well worthy of consideration as to whether, in a good deal of constructional work, iron, of which we see so little nowadays, might not be of material advantage. In the matter of vessels for distilling tar, a great many of those well qualified to give an opinion prefer iron in the construction of these stills. Although, for instance, the cost of material might be 20 to 30 per cent. more in the cost of building (say) a gasholder, would not the longer life probably prove iron to be considerably the cheaper material in the end? This consideration might be closely investigated in several directions.

RELATIONS OF SUPPLIERS AND CONSUMERS.

As a hint to the office department, it might be suggested that, judging from the aspect of the general public, there is a great dislike shown towards the payment of meter-rents. In many cases the charges made in proportion to the actual cost of the meter are, to say the least, extravagant. But assuming the charge made is not from the value point of view excessive, the average householder would, I think, far rather pay an inclusive charge for his gas than a fictitious figure *plus* an extra, the appearance of which is not appreciated but is a source of recurrent vexation. As to all cleaning, repairing, or reinstalling, let the consumer feel he is being dealt with not only fairly, but generously. In no better way can you advertise the benefits of the products you wish to increase the sale of. A highly competent man available to suggest, advise, and generally look after the interests of consumers, as well as producers, should be invaluable to both.

In concluding this somewhat discursive address, I crave your indulgence, as these notes have been prepared while in the midst of a somewhat strenuous business period, which has had its own factors of daily thought to occupy me. Nevertheless, if some of the suggestions in any way give food for thought, and stimulate any of you to improve your great industry, a knowledge of this will lighten the load cast on my shoulders during the remainder

of the tenure of my office, to which, by your kind indulgence, you have been good enough to elevate me.

Mr. Thomas Waddom (Newcastle) moved a vote of thanks to the President for his address, and said that he thought they were agreed that it would rank high among the very interesting addresses which they had heard from the chair during the 36 years of the Association's existence. The President had touched upon many matters that were of the greatest possible interest to the technical side of their industry, and he ventured to forecast that the address would be frequently referred to for the consideration of the suggestions that Mr. Hooper had made, more particularly those relating to the yield of bye-products. He thought there was no one, or few at any rate, more competent to speak on this subject than their President. From the commercial point of view, they would all rejoice to see any increase in the yield of bye-products, more especially of sulphate of ammonia, particularly as there seemed to be such a large margin between the theoretical and the actual yield, because it would enable them to avoid for some time the possible obligation to raise the price of gas owing to the greatly increased cost of the raw material. Perhaps the President would let him refer to his remarks about the beautifying of gas-works. He should say some of them had done so, and some of them had let it alone. He quite sympathized with the idea that gas-works need not necessarily be ugly; and he hoped the President's suggestion applied more particularly to those building new works, because, to his mind, those already built were past redemption. He hoped, however, that their members when building works would try to follow the President's advice, and those who did so he heartily commended to see the tar-works at Sunderland—they might get inspiration from them. The Association were proud to have as their President one who represented an industry so intimately associated with that of their own, and who, during his long residence among them, had earned their sincere esteem and respect by his charming personality and willingness to impart to others his comprehensive store of knowledge on questions of so much importance to their industry. He had great pleasure in moving a vote of thanks to the President for his valuable and interesting address on this occasion.

Mr. C. H. Armstrong (Walker), in seconding the proposal, said it was futile perhaps for him to enlarge upon the remarks of Mr. Waddom; but he might say he thoroughly endorsed them, and would also emphasize every item dealt with in the address. He knew a few of the characteristics of Mr. Hooper. He had known him for many years; and the address was exactly what he had anticipated it would be. It might be rather academical, and not quite conventional from the gas engineer's practical point of view; but he still thought if the President was asked at any future time to enlarge upon the remarks he had made that day, he would do it cordially. There were a lot of items in the address that they could not speak about right off the reel; but he agreed with Mr. Waddom that they, in their leisure moments, might find a lot of germs that would be of great use to them in the future.

The proposal was carried with acclamation.

The President, in acknowledging the vote of thanks, said he was very grateful indeed to the members for the cordial way they had thanked him for what had been a task, but a very pleasant one so far as he was concerned. He also thanked them for the patience they had extended to him in the time he had occupied.

Thanks to College Authorities.

The President said it was next his privilege to move a vote of thanks to the Council of Armstrong College, and to Principal Hadow, for their kindness in allowing them to meet in their beautiful buildings that day, and for permitting them to view them. When he called upon Principal Hadow to ask him whether they could claim his assistance for the day's meeting, he was met with the greatest kindness. Principal Hadow said: "Anything we can do to assist the North of England Gas Managers' Association, we will do; and I will make it my personal business to see that everything possible is done for your comfort and convenience." More than this, Principal Hadow immediately got into communication with Professors Bedson and Louis, whose names were household words in Newcastle, and they that day had given the members their Saturday to make the College speak to them of its advantages and of its use. He would like to say also how much they appreciated the assistance that the scientific side of Newcastle gave to the technical side. He believed nowhere so much as in the North of England had industry and technology and science gone so closely hand in hand, and this was just an occasion when they, as technologists, could feel that, whatever they were doing in a scientific direction, they were being backed up heartily and strongly by their best scientific friends in the College. For this reason, they felt they were under a great debt of obligation to them; and he hoped they would feel that they really owed them a debt of gratitude for their assistance, not only on an occasion like this, but on very many occasions when they had assisted them by lectures and in other ways. He associated with the vote of thanks the names of Professor Bedson, Professor Louis, and Mr. Pruen.

The motion was agreed to with applause.

Professor Bedson, in replying, said he could only say, on behalf of the College, so far as the College had any feeling, it was extremely glad of the opportunity of offering to the Association the facilities of which the President had spoken. It was always a pleasure to the Council, the Principal, and also to the staff to meet those who were connected with the industries in the district. One of the great advantages of institutions of this kind—he meant, speaking from a professor's point of view—was that they were in the midst of an industrial centre, and the more they were brought in contact with the industries the better it was for the College.

The Luncheon.

A luncheon was afterwards held at the County Hotel—the President being in the chair.

Professor Bedson proposed the toast of the "North of England Gas Managers' Association," which, he said, existed for educational and social objects. They had had that morning from their President a most interesting address, which represented something of the educational side of the gas industry; and he was very glad Mr. Hooper had emphasized the importance of the utilization of coal. They were inclined to regard coal as something like the air they breathed, and something they could always expect if they wanted it. He sometimes thought they did not take sufficient care of the coal, nor utilized it to the full to obtain all the energy there was locked up in it. At the same time, he had no doubt that they, as gas managers, were doing their best to make the coal reserves of the country go as far as possible, and also to enable their companies to pay reasonable dividends. He had great sympathy with the educational side of their work. The gas managers were in touch with the latest scientific developments of the day. A few years ago, he was privileged to see what was then regarded as a very great curiosity indeed—incandescent gas lighting—the Welsbach. Now the streets were lighted by this mantle. The gas industry had contributed its quota to the perfection of the idea. He coupled the toast with the name of the President, whose good work they knew as President of a Section of the Society of Chemical Industry, and which had introduced a course of lectures now familiar to them. What Mr. Hooper had done for the Society of Chemical Industry, Professor Bedson felt sure he would do for the Gas Managers' Association.

The President replied, and paid a tribute to the work of the Hon. Secretary, Mr. Herbert Lees.

Mr. W. Hardie (Tynemouth) gave the toast of "Kindred Associations," and said that a spirit of unity pervaded the whole of the gas industry. He alluded to the National Gas Exhibition, and said it reflected much credit on the industry, and drew the attention of people throughout the country to the various ramifications of the gas industry. He believed the exhibition would give the industry that set-on they all desired to see, although they were not at all in a backward state at the present time.

Professor Louis, in the course of his reply, said he was a member of a considerable number of scientific associations, every one of which was more or less connected with the work of the gas industry. Speaking of bye-products, he said some of them would perhaps be more useful than any of those present dreamed of. No man could do more than specialize in his own little corner of work, and therefore they turned to the kindred associations for assistance in their labours.

Canadian Gas Association.

According to accounts which have lately reached us, the sixth annual meeting of the above-named Association, which was held in Toronto towards the close of August, under the presidency of Mr. Arthur Hewitt, was very successful. The President's address consisted of a review of the present condition of the lighting industry in Canada; and the papers, of which there were six, presented plenty of matter for discussion. The following is the list: "The Seller of Appliances," by Mr. W. B. Johnson. "Lighting," in four divisions. (*a*) "Gas Lighting," by Mr. W. Kennedy; (*b*) "House Maintenance System," by Mr. N. E. Gerry; (*c*) "Commercial," by Mr. George H. Hills; and (*d*) "Factory," by Mr. J. A. Forney. "Gas-Stove Retailing," by Mr. H. H. Beer. "What Type of Carbonizing Plant Shall we Adopt?" by Mr. Fred Burnett. "Gas-Mains," by Mr. R. A. Wallace. "A Plea for Accurate Methods of Street Main and Service Work: Their Uses and Some Methods Employed in their Preparation," by Mr. Daniel C. Hill. With the exception of Messrs. Johnson and Wallace, who came from Montreal and Quebec respectively, the above-named gentlemen were all engaged in Toronto. At a luncheon on the afternoon of the second day of the meeting, the retiring President was presented with a beautiful silver tea service, in recognition of his work for the Association during his term of office. This pleasant function brought the meeting to a close. The new President is Mr. A. A. Dion, the General Manager of the Ottawa Electric Light and Gas Company; and the other office-bearers are: Vice-Presidents, Messrs. Howard Mann and R. A. Wallace; the Secretary and Treasurer, Mr. John Keillor, of Hamilton; and the Executive Committee, Messrs. S. Carter, A. Hewitt, J. Keillor, J. P. King, and J. S. Norris.

Microscopic Examination of Coal.—At the recent annual meeting of the Institution of Mining Engineers, Mr. James Lomax read a paper entitled "Further Researches in the Microscopical Examination of Coal, especially in Relation to Spontaneous Combustion." The author, it may be remembered, has made a thorough study of this subject, and at the November meeting of the Manchester District Institution of Gas Engineers last year he showed a number of interesting microscopic slides illustrating different sections of coal formation. The paper he has just read was a continuation of one presented to the Institution two years ago. In it he advocates a thorough microscopic examination of coal—of each band, bed, and lamma. For the purpose of his paper, he examined upwards of 200 sections of coal taken from seams liable to gob-fires, and compared the results with those relating to seams not so subject, and drew attention to the various alterative products which he found.

LOW-TEMPERATURE CARBONIZATION IN VACUO,

IN ITS RELATION TO THE PRODUCTION OF SMOKELESS FUEL, OILS, AND MOTOR SPIRIT.

By F. D. MARSHALL, M.Inst.C.E.

[A University Lecture to the Manchester and District Junior Gas Association, Oct. 4.]

Gentlemen—Privileged as I am in being permitted to address you to-day, I am fully aware of the fact that I am treading on very debatable ground; but I am present as one of yourselves—a gas engineer addressing gas engineers and as one who has had a closer acquaintance with systems of low-temperature carbonization than perhaps any one else in our profession. I am not here to preach revolutionary doctrines with the idea of inducing you to forsake ploughing your very profitable furrow to turn fresh soil in another field of enterprise.

As one who has had the control and handling of a very successful installation of low-temperature carbonization, it struck me that you might like to hear first-hand a colleague's impression and ideas of the process. For the sake of simplifying matters, let me pose before you to-day as the exponent and advocate of low-temperature systems of carbonization, and to address you for the nonce as if we belonged to two different schools of carbonization ideals and thoughts. I know full well what is at the back of your minds, as this is reflected from time to time in the attitude assumed by our leading Technical Journals—viz., the "JOURNAL OF GAS LIGHTING" and the "Gas World"—towards low-temperature carbonization, and although the moving spirits of these journals do not, for the present, see eye to eye with me in this matter, I know from past experience that they will deal generously and impartially with what I have to say to you to-day.

It is clear that the systems of high and low temperature carbonization move in different orbits; for while you are striving after higher and still higher degrees of heat in your retorts, the low-temperature advocates are seeking to descend to a lower and lower grade. Fundamentally, there is a matter of some 1200° Fahr. between the two systems. While your *métier* is to produce gas and still more gas from a ton of coal, the low-temperature system is based on producing a smokeless fuel, oils, and motor spirit. The production of gas is, with them, quite a secondary consideration, except for the very valuable products it yields by "stripping." So in the matter of gas production the two systems do not impinge; neither do they in the matter of liquid bye-products, as the tar produced from gas-works processes differs entirely from the oils produced by the other process. Where the two processes probably will impinge is in the production of solid fuels and ammonia; and in the natural course of events there must be rivalry at these points of contact. For the present, I see "through a glass darkly" as to how far a low-temperature process will be of any assistance to our profession. Nevertheless, I do see; and, later, I will expound the vision, however obscure it may be.

There is one point I wish to emphasize and drive home, and that is that low-temperature systems have come to stay, and will have to be reckoned with by the gas industry in the future. I will further state that the low-temperature advocates are looking neither for help nor assistance from the gas industry, for they believe there is room for both—to the ultimate public benefit. What low-temperature distillation aims at is the displacement of coal in the domestic fire-place by a smokeless and cleaner fuel, and the recovery from this coal of the inestimably valuable products in the form of oil spirits and ammonia now being utterly and recklessly wasted.

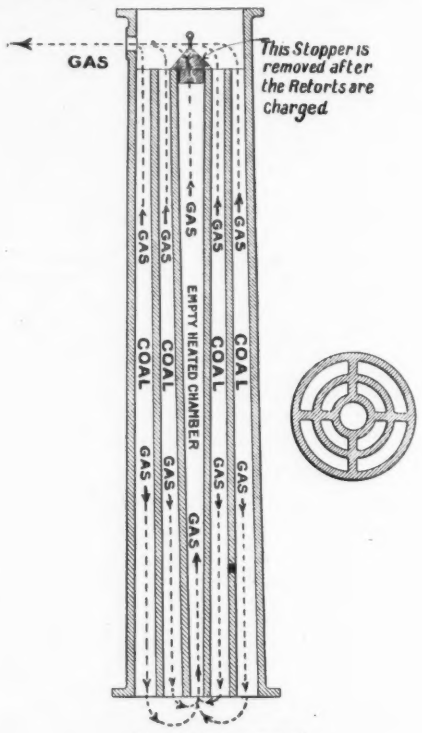
It would be impossible to start any discussion on low-temperature systems without some reference to that arch child of sorrow "Coalite." I followed technically its wayward career very closely; and it failed, and failed dismally, through never having at its command the right system of retort by which the essential low temperature heat could be brought to the core of the charge within a reasonable time. This was the "snag" coalite struck; and it wrecked it. But whatever the failings of "Coalite" may have been, it certainly created a demand for a high-grade smokeless fuel, which is being daily realized.

It has often occurred that in working out a problem, or starting an industry, a secondary branch or off-shoot of the same has proved more practical than the original idea; and so it has been in this case. Starting with Mr. Simpson's plan of the dissociation of metals *in vacuo*, the secondary idea evolved itself of submitting coal to the same conditions of distillation; and the "Tarless Fuel Syndicate," who had acquired the Simpson patents, set to work in this direction, with the results I am about to describe. I will not detain you by recounting the failures attending the first attempts to work the vacuum process at the works erected at Pinxton, in Derbyshire. This was another child of sorrow; and had it not been for the supreme faith in their child, and had the foster-parents been men of less tenacity of purpose, bankruptcy would have been their fate.

Although the principles of the Pinxton plant were correct, the plant was so ill-designed that it was doomed to failure. Nothing daunted, what was usable was removed to Battersea, and steps taken to start afresh. Low-temperature distillation, *per se*, cannot, in my opinion, ever be completely successful if carried out under pressure, as, with a temperature of only 900° to 1000° Fahr., the time of distillation would be too long, and the valuable oil constituents and the coke would be ruined. But, as we have proved, low temperature, *plus* a complete, or nearly complete, vacuum in the retorts, enables us to carbonize in from three to four hours, and so save the light oils we are in search of, and at the same time produce a hard, dense, easily-ignitable coke or fuel, containing 5 to 10 per cent. of volatile matter (probably methane) and more than 80 per cent. of carbon free from all tarry and condensable matter.

The fact that low-temperature distillation to be successful must be carried out under a vacuum seems to be borne out by the extraordinarily interesting experiments conducted by Professor S. W. Parr and Mr. H. L. Ollin, of the University of Illinois, which go to prove that in low-temperature carbonization a good coke texture can be obtained, and the other products be more or less modified in their characteristics, by the exclusion of oxygen from the retort. These gentlemen had absolutely no knowledge of what was being effected commercially by the Tarless Fuel Syndicate on this side, and received with considerable satisfaction the accounts we sent them of the process. A full description of Professor Parr's and Mr. Ollin's investigation appeared in the "JOURNAL OF GAS LIGHTING" for May 20 last (pp. 533, 595); and I commend the perusal of these reports to you as matter of absorbing interest from a purely scientific standpoint.

But low-temperature distillation, *plus* vacuum, cannot be perfectly successful without perfect mechanical appliances, differing altogether from previous methods; and this applies principally to the form of retort. The previous installations erected at Pinxton, and the first after the removal from Pinxton to Battersea, proved conclusively that neither round, square, nor oblong sectioned vertical retorts would permit in a short space of time the comparatively low temperature to permeate from the periphery of the charge to the core or centre. An absolutely thin layer of coal—not exceeding 2½ to 3 inches—is necessary; and this condition has been obtained by the annular or concentric form of retort our engineer (Mr. Tozer) has perfected, and which has enabled us to fully solve this problem.



Tozer's Patent Retort.

After abandoning the circular form of retort, we started with an annular shape with one ring of coal, or one annular space with a hollow centre. This was so far successful that Mr. Tozer was induced to devise a retort with a second interior annular space; and it is probable that in the next installation a third annular space or concentric will be constructed. We have established that the connecting ribs easily transmit the heat from the periphery to the core, and, in case of necessity, the centre space (now void) can be made to conduct the heating gases. So far this has proved to be unnecessary.

Referring to the diagram of the body of the retort, there is one point to which I wish to draw your attention, and that is the passage of the evolved gases. These are not compelled to pass from the bottom of the charge to the top, but are divided each way; half the gas being removed by means of the centre open core of the retort. For business reasons, which I am sure you will appreciate, I have not depicted the important mechanism connected with the closing and locking of the lower discharging doors, which can be easily operated by one man from the top of the bench. But the designing of these doors to withstand the high vacuum was a matter of much time and thought. They work perfectly;

and on being released the coke drops out in two long slabs, samples of which are before you. No quenching is required, as the coke is black; and to this fact we owe the freedom from breeze. The density of the coke is due to the compression of the coal between the annular spaces—a density which would effectually prevent the quick evolution of the gases were it not for the extreme vacuum employed, which, to use an Irishism, keeps the pores open. How far this vacuum is equivalent to units of heat in perfecting the carbonization of the coal we have yet to determine; but the matter is being investigated. It is a very pretty problem.

The condensers vary from the ordinary, inasmuch as they are sectionized, as with oil vapours produced at the temperature we employ there is a distinct gradation in their condensability and deposition, and the tar oils collected in each section vary distinctly in quality and composition. We are able to control this by the sectioning arrangement. The heavy vapours are condensed and removed by one of Holmes's Pelouze and Audouin impact condensers, the seal of which is inside the vessel. The efficiency of this apparatus under the high vacuum is remarkable; and it seems to have been designed for our special benefit, as the old system of outside seal would be useless under a high vacuum. The gas is drawn through all the condensing plant by a direct-acting Worthington vacuum pump. It is the one originally employed at Battersea; and although it has worked under the most trying and exasperating conditions for some years, it has never failed. It is getting worn out now, and sometimes fails to keep up the vacuum of 26 inches of mercury which it originally did. It will retire by-and-by to enjoy an honoured rest.

The next step is original and intensely interesting. By the time the gases have passed the vacuum pump, everything condensable under atmospheric and impact conditions has been removed; but tailing-on to the vacuum pump is a compressor, in which the entire gas is compressed under a pressure of 50 to 60 lbs. on the square inch. By a mechanical arrangement, the pressure is suddenly released; the result being that the gas parts with a vapour which, on speedily condensing, proves to be a spirit of high value, The yield from this portion of the plant is approximately one gallon of spirit (specific gravity ·818) per ton of bituminous slack. We do not tap this off; it runs into the reservoirs receiving the other spirits which we obtain subsequently. The compression and expansion are quite automatic, and the apparatus needs no special attention. As may be imagined, we are going very deeply into this question; and the oil expert (Dr. Young, Ph.D.) attached to the Company is devoting special attention to it.

Passing from the compressing plant, the gas at this stage, of approximately 750 B.Th.U., passes through a stripping plant, which reduces it to about 300 B.Th.U. It has then just a trace of luminosity; but it is, on the other hand, a perfect gas for engine purposes, or for splitting-up into hydrogen and carbon. The choice of the crude oil for stripping purposes is important. This we have determined; and a proper oil can be saturated up to 15 or 16 per cent. without becoming "fatigued," and on distillation yields the absorbed spirits readily. These spirits must not be confused with benzols, as they are practically paraffins, or paraffinoids, and their homologues. These spirits, when mixed with those from the compressing plant, amount, on the average, to:

Cannel	6·74 gallons per ton
Slack	3·3 ,, ,, ,,
Specific gravity	·796 and ·818
Boiling point	170° C.

After washing these spirits with alkalies to remove the acids, a motor-cycle was run 200 miles on 2 gallons of the spirit.

The above figures represent the quantity of the spirits obtained (*a*) by compressing, and (*b*) by "stripping" the gas.

We have now to deal with the other products—viz., the gas, coke, and condensates.

Gas.—The yield of gas per ton of coal is approximately 5000 cubic feet from slack and 7000 cubic feet from cannel, and it is partially consumed under the retorts and for running the works plant, after it is stripped of its valuable products. The balance is disposed of according to circumstances; but it is now proposed to split it up into hydrogen and carbon in accordance with a scheme patented by Dr. Rudolf Lessing. It is a very excellent engine gas.

Coke.—Over 150 different tests of samples of coals, slacks, and cannels have been made, extending over several years; and it is found that the process will deal with almost any range of coal or cannel, including peat; and an excellent smokeless fuel is produced. We have found that, if a coal is too poor in bituminous matter, the simple mixing with a percentage of another more bituminous coal ensures good results. The demand for the fuel has been far greater than we ever anticipated, and our 50 tons per week plant must give way to something larger. We are now contemplating erecting, near London, a plant to produce 200 tons a day. We are assured as to the output, and we appear to have no difficulty in obtaining over 30s. per ton for the article.

Condensates.—Although the process was based originally on the production of a smokeless fuel, yet later results appear to prove that coal can be made to yield a most valuable condensate in the form of oils, which, when fractionated or split-up, yield products of exceptional value, as set forth in the accompanying statements, which are simply typical of many others. These tar oils differ absolutely from ordinary gas-works tars. They contain no benzenoid hydrocarbons, nor the volatile solids, naphthalene or anthracene; but they yield, upon ordinary fractionation, paraffins and paraffinoid hydrocarbons and unsaturated derivatives. The average yield of water-free crude condensates is from—

Cannel (poor)	52 to 60 gallons per ton
,, (good)	60 to 80 ,, ,, ,,
Slack	20 to 25 ,, ,, ,,

The specific gravity is 1·060, or lower than that of gas tar.

The following results were obtained on test runs of 2 to 5 tons of coal, and were conducted under the supervision of Dr. Young and Dr. Dunstan, of the East Ham Technical College, and may be accepted as reliable. Dr. Young's report is appended.

CANNEL COAL NO. 1.

14 cwt. of tarless fuel.
5000 cubic feet of surplus gas, stripped to 300 B.Th.U.
25·33 lbs. of sulphate of ammonia.
44 gallons of water-free oil, as per accompanying analysis A.
8·75 gallons spirit recovered by compression and gas stripping, as per accompanying analysis B.

Analysis A.

44 gallons of water-free oil, specific gravity ·940.
Water in oil (which has been deducted), 7 per cent.
Light oil, distilled at 170° C., 2·9 gallons.
Middle oil, 170° to 270° C., 7·9 gallons.
Oil distilling above 270° C. (crude lubricating oil), 11·9 gallons.
Tar acids (cresylic acid and homologues), 3 gallons.
Pitch, 191 lbs.

Analysis B.

2·6 gallons oil recovered by compression and expansion, specific gravity ·858, 75 per cent. of which distilled up to 200° C. = 1·95 gallons (the oil distilling between 85° and 150° C. had specific gravity ·812).
The stripping oil carried 7 per cent. of light oil boiling below 150° C., with a specific gravity ·820 = 6·8 gallons.

CANNEL COAL NO. 2.

14 cwt. tarless fuel.
5000 cubic feet of surplus stripped gas.
6·5 lbs. of sulphate of ammonia.
53·5 gallons of oil, as per accompanying analysis C.
4·93 gallons spirit, as per analysis D.

Analysis C.

53·5 gallons of water-free oil, specific gravity ·9165.
Light oil, distilled at 170° C., 3·8 gallons.
Middle oil (specific gravity ·832), 170° to 270° C., 14 gallons.
Oil above 270° C. (specific gravity ·886), crude lubricating oil, 20 gallons.
Tar acids, 4 gallons.
Pitch, 150 lbs.

Analysis D.

Compression and expansion oil, specific gravity ·796; 0·43 gallon.
Light oil, specific gravity ·796, from stripping oil, 4·5 gallons.

BITUMINOUS COAL.

14 cwt. tarless fuel.
5000 cubic feet of surplus stripped gas.
23·8 lbs. of sulphate of ammonia.
22 gallons of oil, as per accompanying analysis E.
2·2 gallons spirit, as per accompanying analysis F.

Analysis E.

22 gallons of water-free oil, specific gravity 1·060 (water—9 to 9·5 per cent., which has been deducted).
Light oil, distilled at 170°, 1·3 gallons.
Middle oil, 170° to 270° C., specific gravity ·970, containing 10 per cent. of tar acids (cresylic and homologues), 5·7 gallons.
Oils above 270°. A large proportion can be obtained, though with some decomposition. If the distillation is stopped when 40 per cent. of bituminous pitch is left, there is obtained heavy oil, specific gravity 1·04, flash-point 125° C., 4 gallons.
Pitch (bituminous), 90 lbs.

Analysis F.

The light oils from the compression and expansion plant and from the stripping oil yielded:
Oil distilling up to 150° C., specific gravity ·818, 1·2 gallons.
Oil distilling 150° to 200° C., specific gravity ·845, 1·0 gallon.
The coal was found to contain 5·4 per cent., and the tarless fuel 7·4 per cent. ash.

DR. YOUNG'S REPORT.

The process is one of destructive distillation of coal at low temperature (900° to 1000° Fahr.) under a high vacuum (20 to 25 inches of mercury), and results in the formation of products very different to those obtained by the usual gas-works practice of distillation at high temperatures. While the general nature of those products is the same whatever coal may be used, the amounts in which they are obtained vary with the class of coal, consisting generally of 70 per cent. of coke or residue and about 50 gallons of oil from a cannel coal, or 24 gallons of oils per ton from a bituminous coal. With some cannel coals, the yield of oils has run to over 80 gallons per ton of coal. In the case of the three coals, actual working details of which are appended, the first cannel gave a total of 52·7 gallons, the second cannel 58·4 gallons, and the bituminous coal 24·2 gallons of oil per ton of coal. The process results also in the formation of ammonia in generally good amounts, but varying markedly with the coal employed; the three coals mentioned yielded ammonia equivalent to 25·33 lbs., 6·5 lbs., and 23·8 lbs. of ammonium sulphate per ton of coal respectively.

The coke, or residue, consists of a dense, but porous, fuel, which is not readily friable. It is easily ignited, and can be burned in any ordinary open grate, when it forms a clear, hot fire, burning with a good flame, but not giving any smoke or soot. The fuel can also be used in the manufacture of suction gas, with the great advantage of yielding a gas entirely free from tarry matters.

In regard to their specific gravities, the "tarless fuel" oils lie between shale oil and gas-works tar, to the former of which they are much the more closely related in their chemical nature, consisting, as they do, of paraffinoid compounds and unsaturated derivatives. The benzenoid hydrocarbons, including the volatile solids, such as naphthalene and

anthracene, which form such a large proportion of gas tar, are entirely absent. Hence the light oils on fractionation yield solvent naphtha, and a motor spirit which resembles petrol rather than benzol. The total light oils, obtained partly by fractionation of the condensates and partly by stripping the gas from the coals quoted below, amounted to 11·6 gallons, 8·7 gallons, and 3·5 gallons per ton of coal.

Some further interesting figures, however, may be reproduced from results tabulated by Mr. Tozer during the long series of tests with the plant:—

LANCASHIRE COAL D.S. NUTS.

Tarless fuel	78 per cent.
Water-free tar per ton of coal	20·19 gallons.
Sulphate of ammonia per ton	45 lbs.

Upon analysis the tarless fuel made from the above coal gave—

Fixed carbon	92·86 per cent.
Volatile matter	3·86 per cent.
Ash	3·28 per cent.

This is a good fuel for gas-producer plants.

COAL DUST FROM THE SAME COLLIERY.

Tarless fuel	74 per cent.
Water-free tar per ton of coal	15·4 gallons.
Sulphate of ammonia per ton	20·7 lbs.

Upon analysis the tarless fuel showed—

Fixed carbon	82·85 per cent.
Volatile matter	8·26 per cent.
Ash	8·89 per cent.

This is an excellent fuel for domestic purposes, burning with a clear flame, quite smokeless, and giving out intense heat.

DURHAM COAL FINES.

Tarless fuel	78 per cent.
Water-free tar per ton of coal	14·6 gallons.
Sulphate of ammonia per ton	10·91 lbs.

ANOTHER SAMPLE FROM THE SAME PIT YIELDED

Tarless fuel	76 per cent.
Water-free tar per ton of coal	16·1 gallons.
Sulphate of ammonia per ton	9·11 lbs.

Three different samples of Yorkshire coal were tested, with the following results—

FIRST SAMPLE.

Tarless fuel	73 per cent.
Water-free tar per ton of coal	19·2 gallons.
Sulphate of ammonia per ton	11·71 lbs.

SECOND SAMPLE.

Tarless fuel	73 per cent.
Water-free tar per ton of coal	17·2 gallons.
Sulphate of ammonia per ton	11·5 lbs.

THIRD SAMPLE.

Tarless fuel	78 per cent.
Water-free tar per ton of coal	22 gallons.
Sulphate of ammonia per ton	10·5 lbs.

A LANCASHIRE CANNEL COAL YIELDED

Water-free oil per ton	85·1 gallons.
Water-free tar per ton	4·4 gallons.

A SCOTCH CANNEL COAL YIELDED

Water-free oil per ton	61·4 gallons.
Sulphate of ammonia per ton	18·06 lbs.

ANOTHER SEAM OF SCOTCH CANNEL YIELDED

Water-free crude oil per ton	48·9 gallons.
Water-free tar per ton	8·9 gallons.
Sulphate of ammonia per ton	33·16 lbs.

A very rigid test was made quite recently under the supervision of a gas engineer connected with a great railway company; and I cannot do better than place before you the results worked out on a commercial basis, from which it is anticipated that, after paying for the cost of the coal, a *net profit of some* 15*s. per ton will be realized from each ton of coal treated by the process.* We did not select this coal. It was sent to us to see what we could do with it. It made a remarkable smokeless fuel—dense, non-friable, and of great heating power.

BIGNALL HILL WASHED PEARLS.

One ton of Bignall Hill washed pearls yielded, under a temperature of 950° to 1000° Fahr., and under a vacuum of 15 to 20 inches of mercury, with a distillation time of approximately 3½ to 4 hours—

	£ s. d.
70 cwt. fine fuel = 14 cwt. at 30s. per ton	1 1 0
5000 cubic feet of gas of a value, after stripping-down to 300 B.Th.U. (approximate) of 3d. per 1000 cubic feet.	0 1 3
	£1 2 3
Deduct cost of coal, estimated at 15s. per ton c.i.f. London	0 15 0
	£0 7 3
,, cost of carbonizing per ton, including cost of fuel under retorts	0 2 6
	£0 4 9
Add ammonia, calculated as sulphate, 23·8 lbs. net value	0 2 0
	£0 6 9
Add oils, 22 gallons, as per accompanying analysis, net	0 6 9
,, spirits recovered by compression and gas stripping	0 2 2
Net value of residuals per ton of coal carbonized	£0 15 8

Analysis of the figure 6s. 9d. obtained from fractionating the 22 gallons of oils per ton condensates—

Sp. gr. of condensed (water-free) oils, 1·060; water, 9 to 9·5 per cent.

	£ s. d.
Light oil distilled at 170° C. = 6 per cent. = 1·3 gallons (Good for motor spirit solvents, &c.), gross value	0 1 3
Middle oil distilled at 170° to 270° C. sp. gr. ·970 = 25 per cent. = 5·7 gallons containing about 10 per cent. valuable tar acids (cresylic acid and homologues) gross value	0 3 6
Oils above 270°. A large portion can be obtained, though with some decomposition. Assuming the distillation is stopped when 40 per cent. of bituminous pitch is left, there remains 19 per cent. of heavy oil, sp. gr. 1·04, flash-point 125° C., which is considered a crude lubricant, and which, when refined *in vacuo*, will yield—	
4 gallons of lubricant, gross value	0 2 0
90 lbs. bituminous pitch	0 2 6
	£0 9 3
Deduct cost of fractionating, &c.	0 2 6
Net value of oil condensates	£0 6 9

Recovery of spirit net value 2s. 2d. by compression and stripping plant.

One ton of coal yielded—
1·2 gallons up to 150° C. spirits of sp. gr. ·818
1·0 ,, ,, 200° C. ,, ,, ·845

Note.—On these spirits, Dr. Dunstan ran a motor cycle with satisfaction 200 miles.

Ash in Coal and Coke.—On analysis, the coal was found to contain 5·4 per cent. of ash, and the coke 7·4 per cent. of ash.

The ammonia, of course, varies with the nitrogen in the coal; and I do not anticipate getting a higher yield than is obtained by ordinary gas-works practice. The question of the correct temperature of carbonization to produce the maximum quantity of ammonia is a very obscure one; and I do not know any authority which can state definitely the right temperature. This is a point which will well repay study and research.

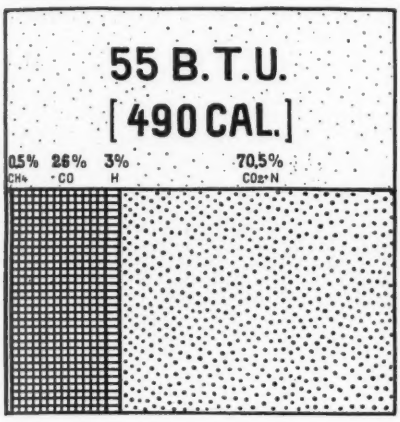
I have now finished my discourse as far as it relates to the description of a low-temperature plant which has weathered the adverse storms of failures, and has become a commercial success. Concerning this point, I have no doubt whatever. But, believe me, gentlemen, it has been no light work. Five years of solid hard toil, many heartburnings, much anxiety, and capital freely spent. You, or any of my professional colleagues, are welcome, as I mentioned before, to inspect the plant at your leisure, to remain and work it, if you will. There is nothing to conceal. It is a clean, straightforward installation, of which we are justly proud; and from A to Z it reflects the greatest credit on our Engineer, Mr. Tozer. Candidly, I confess that, when I was invited to join the Board of the Company as its Technical Director, I hesitated. In fact, I was sceptical. But after my colleagues had accepted my recommendation to scrap the first bench of retorts erected at Battersea, and to substitute for them Mr. Tozer's larger and improved form, after a few weeks' run of the rebuilt plant, all my doubts and fears vanished; and you will pardon me if I now state that I am filled with enthusiasm.

LOW-TEMPERATURE CARBONIZATION.

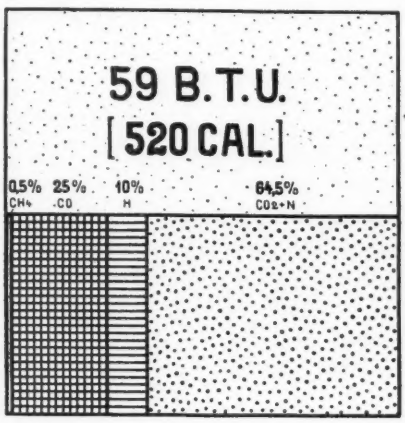
I am now coming to a point when I must lift my darkened glass, and will try, to the best of my ability, to depict to you what I see. Hitherto I feel that you have listened to my descriptions with a more or less wondering interest; but nothing has been said which has had any convincing effect upon you. It has been too abstract. Now I will endeavour to bring home a phase of the low-temperature carbonizing system which may possibly appeal to you and awaken a keener interest.

It is a mere platitude to state that for over fifty years—nay, almost for a century—the gas industry has enjoyed a phenomenal measure of prosperity, protected and comforted by the gigantic monopoly which it has, and does, enjoy; it could not be otherwise, where the uprooting of the streets and thoroughfares is concerned. Nevertheless, it is clear to us all that the enemy is at our gates, and the "*Mêne, mêne, tekel, upharsin*," is written on our walls. We cannot be blind to the inroads electricity is making on our preserves. We cannot be blind to the phenomenal progress electricity has made within the last 25 years—say, rather, within the last 10 years. Where we have marched a yard in science connected with gas engineering, electrical science has marched a mile. When our science is confined practically to ourselves, and to just a few of the great scientists of the outlying world, electrical science has laid claim to the brains and science of whole continents. We are fighting against terrible odds, and shall soon be driven over the glacis to our last stronghold—gas heating. As the purveyors of illuminants, we were almost annihilated some few years ago, until saved by the advent of the wonderful Welsbach light. But the reply to this, by the electricians, was the introduction of the metallic filament lamp.

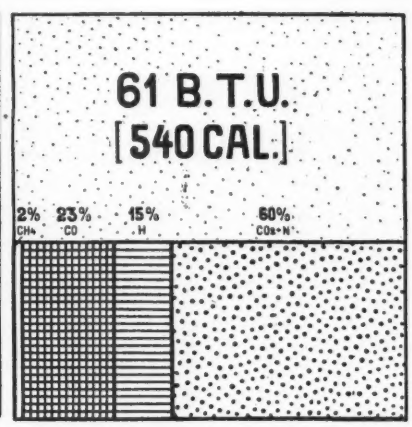
We are now fighting with our backs to the wall. We may console ourselves by the assumption that, per unit of light, gas is cheaper than electricity. For the time it may be so. But do you imagine for one moment that electricians will remain where they are, and that the marvellous advance of the last 25 years will be checked? Fight we will, and fight we must, to the last, with all the brains and the science the gas industry can command. But



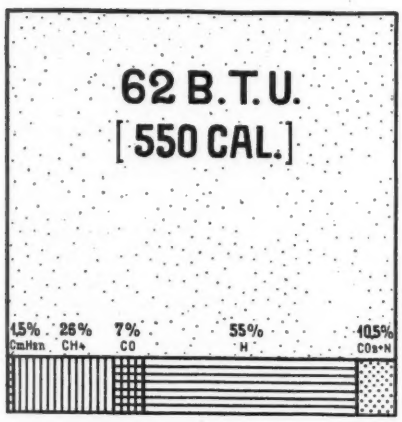
No. 1.—Blast Furnace Gas.



No. 2.—Producer Gas from Coke.

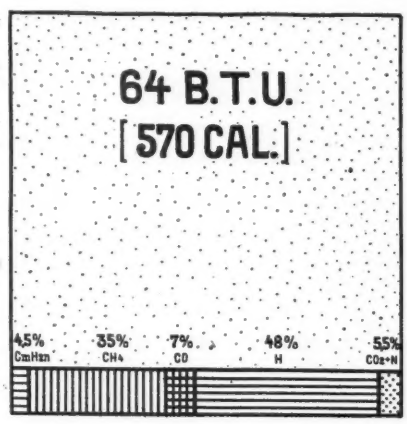


No. 3.—Producer Gas from Anthracite.



No. 4.—Coke Oven Gas.

Nos.	1	2	3	4	5
Kind of Gas	Blast Furnace Gas.	Producer Gas from Coke.	Producer Gas from Anthracite.	Coke Oven Gas.	Town Gas.
Net calorific value in B.Th.U.	100	120	140	450	560
Theoretical approximate Quantity of air per cubic foot of gas, in cubic feet	0·69	0·87	1·08	4·2	5·2
Usual excess of air, per cent.	20	20	20	40–50	40–50
Actual approximate Quantity of air per cb. ft. of gas, in cb. ft.	0·83	1·04	1·3	6·3	7·8
Calorific value of 1 cubic foot of mixture of gas and air in B.Th.U.	55	59	61	62	64
Percentage of hydrogen per cubic foot mixture of gas and air	1·6	4·9	6·5	7·5	5·5



No. 5.—Town Gas.

MIXTURES OF GAS AND AIR: COMPOSITION, QUANTITY OF AIR AND CALORIFIC VALUE OF SOME MIXTURES OF GAS AND AIR.

[The lower portion of the squares represents the gas and its composition; the upper portion represents the air.]

unless we meet the enemy by concerted and rational measures, we must eventually succumb.

By, I will not say supineness, but a dogged determination to stick by their industry, and to entertain no ideas beyond it, the directorships of the great London Gas Companies have allowed the enemy to establish itself firmly within their gates. The opportunity for acquiring the supply of electricity for their districts has been lost; and they daily see great slices of their old industry taken from them as suppliers of artificial light. Other, but far less influential, companies have taken the alarm, and all credit is due to the directorships of these companies—to mention Aldershot, Ascot, Bishop's Stortford, Crowborough, Farnham, and Herne Bay—who have grasped the situation in time, and have applied for parliamentary powers to supply electricity. Choosing between nomad electrical company promoters and firmly-established, well regulated and controlled gas companies, do you believe for one moment that the authorities concerned with the granting of concessions would not have preferred granting them to the tried gas companies, with their splendid record of years, and with the greatest facilities for raising capital if they only showed their shareholders good reason?

Well, we have lost much business. Let us see how we can regain it. The gas companies who have lost their chances must make friends with the enemy, and those who have the electrical business in their hands must bestir themselves to see how they can produce it at a profit.

Electrical Power from Gas-Engines.

Now I must return to technicalities. It is evident that, if electricity is to pay handsomely, the power must be raised by gas-engines; for it is now almost a copybook axiom that the thermal efficiency of a good gas-engine is up to 28 per cent., while the thermal efficiency of the most perfect steam-engine is only 15 per cent. For an equal heat supply, the gas-engine can develop twice to thrice as much power as the steam-engine or steam-turbine. But this power, to be economical, must be by the medium of producer gas. Whatever the superior thermal efficiency of town gas, it cannot compete with producer gas coupled with bye-products recovery.

Looking at the above diagrams, you may at first think that it can. The calorific value and composition of the gas *drawn into the cylinder*, and not the calorific value of the gas alone, governs the working output of a gas-engine. The richer the gas, the larger is the quantity of air theoretically required for combustion, and correspondingly larger is the quantity of surplus air necessary for a proper explosive mixture to ensure complete combustion. The quantity of surplus air in the case of poor gas (producer gas) of 90 to 170 B.Th.U. is about 20 per cent.; and in the case of richer gas (town gas), of 560 to 600 B.Th.U., it is 50 per cent.

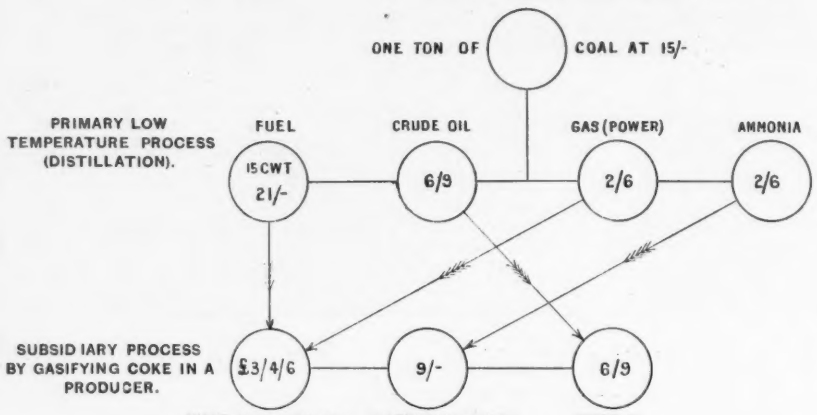
From the diagrams and tables before you, it is evident that the calorific values of the various mixtures *burned in the engine cylinder* differ to only a slight extent for the various kinds of gas. Therefore it is evident that town gas from a ton of coal, yielded at the rate of 12,000 cubic feet per ton, and selling (say) at 2s. 6d. per 1000 cubic feet, cannot compete with the gas from a ton of coal yielded at the rate of 150,000 to 200,000 cubic feet per ton from a producer, and selling at a few pence per 1000 cubic feet. Thus we may dismiss, once and for all, as a commercial proposition, the production of electricity by means of town gas. It appears obvious, therefore, that the source of electricity, so far as this country is concerned (as we have no waterfalls), must be through coal gasified in generators coupled with bye-product recovery. As this is purely a gas engineering problem coming within the scope of the operations of a gas-works, I would suggest to those gas companies who have missed the golden opportunity of handling the electricity supply first hand, that they approach the electrical corporations within their districts with the suggestion that they (the gas companies) provide the electrical installations with either power or electricity in bulk, to be measured at the station switchboard—leaving to the electrical corporations the field of distributing it.

The gas companies can point out that they have the land, the organization, the technical staffs, and, with the great credit they already possess, the means of raising capital, if such be necessary. They can likewise point out that they have the markets for the tars, oils, and ammonia. I have long thought of such a combination for bringing about a mutual system of working between two such enormous enterprises. This would naturally not do away with the competition; but it would be a competition based on compensating influences. Should the electrical undertakings eventually gain the upper hand, it would mean that the gas companies would lay down retort-houses and erect generating plant.

This is a better proposition than fighting a losing battle with nothing to fall back upon in the end. It is a simple safeguard for building-up a new business, should, by force of circumstances

DIAGRAM SHOWING THE VALUE OF THE PRODUCTS FROM ONE TON OF COAL.

BASED ON PRIMARILY DISTILLING THE COAL AT LOW TEMPERATURE, AND SUBSEQUENTLY USING THE COKE IN GAS PRODUCERS TO GENERATE ELECTRICITY.



ORIGINAL PROCESS.

Total	£1 12 9
Less production (including cost of coal)	17 6
	15 3 Net.

SUBSIDIARY PROCESS.

Total	£4 0 3
Less production (including cost of coal)	1 9 0
	£2 11 3 Net.

N.B.—The production of sulphate is based on 1 per cent. of nitrogen in the original coal, on a 70 per cent. efficiency basis.

The values of the products by the first process are carried down to add to the values obtained by the second process, as indicated by the arr ows.

and the march of electrical science and progress, the older gas enterprise be forced to retreat. I believe that, if properly handled, this plan would be welcomed by the electrical undertakings themselves. To those gas companies who have been far-sighted enough to see the inevitable approaching, and who have acquired statutory powers to supply electricity, I would at once commend thinking of nothing but generators for the source of their power.

Gas Generators as Sources of Power.

And now I am coming to the point where I see more clearly through my darkened glass, and where the low-temperature carbonization processes may possibly come to the gas companies' aid. A gas-generator or producer requires nothing but carbon, and the less it is contaminated with bituminous matter in the shape of volatile products the better. These add great expense for their removal far beyond their mercantile values, except the ammonia, which is recovered in generators in greater quantity than by any other known process. I would suggest, instead of charging generators with crude coal direct from the collieries, first to treat it by a low-temperature plant similar to that at Battersea, recovering the oils, gas, and what ammonia is produced by such a process, and then to feed the generators with the resultant clean and pure carbon coke.

This matter has been very carefully investigated by my colleagues and myself, and the above diagram sets forth in fairly approximate figures the results.

Summed up, it means that one ton of coal, costing (say) 15s., will, if first treated by a low-carbonization scheme for the recovery of the bye-products, and the resultant carbon coke converted into power by means of "producers" (recovering the balance of the ammonia), that the net yield per ton of coal operated upon would approximate to £2 11s. 3d. per ton, and permit electrical current to be placed in the switchboard at 0·10d. per unit, and sold at ½d. This is not an abstract proposition, as the following are the actual figures, worked out by an electrical colleague and myself, for an installation in Australia. My colleague is over there with the question in hand. It is based on gasifying 200 tons of coal per day, or 73,000 tons per annum, by means of the two processes indicated.

Cost of Plant.

Electric generating plant	£125,000
Tarless fuel plant	50,000
Producer gas plant	50,000
	£225,000

Estimated Profits.

Electricity at ½d. per unit (selling price) = £3 4s. 6d. per ton of coal.	£235,425
20 gallons of oils per ton, at 2½d. gallon	15,208
2300 tons of sulphate, at £14	32,200
	£282,833
Less cost of production and depreciation at 14s. per ton	£51,000
Cost of coal at 15s. per ton	54,750
Office and management	10,000
	115,750
	£167,083

Or £167,083 return per annum on a capital outlay of £225,000 (say) £250,000.

In conclusion, I crave your indulgence for having inflicted such a long discourse upon you; but I wanted to cover the ground from beginning to end. I wished to show that, to obtain the full value from coal, it must be treated in a rational manner. If so treated, it will provide the nation with an even more valuable asset than it represents at present. To those who are interested in the electrical problem I wished to prove that it is of far greater importance to extract from coal its valuable constituents before gasifying it in its crude state for power purposes. I cannot believe that the present stupendous waste of coal can be allowed to continue. If coal is to become more valuable to the nation at large, it will be for gas engineers to prove this value; and I commend the question in all sincerity to your thoughtful consideration.

APPENDIX.

A closer analysis of the tar oils and spirit obtained by fractionating the crude oils that are obtained by the Tarless Fuel Vacuum Process.

Motor Spirit.—Distils completely below 160° C.
Specific gravity ·800 at 15° C.
Flash-point below 60° Fahr.

Naphtha.—Boiling point 160°-180° C.
Specific gravity ·838 at 15° C.

First Middle Oil.—Boiling point 170°-230° C.
Specific gravity ·921 at 15° C.
Flash-point 136° Fahr.
Viscosity η at 0°, 0·0808.
Calorific value, above 18,045 B.Th.U.

Heavy Oil.—Boiling point 270°-300° C.
Specific gravity ·992 at 15° C.
Flash-point 254° Fahr.
Viscosity η at 0°, 0·6053
Calorific value above 19,210 B.Th.U.

Residual Oil (crude lubricant and paraffin wax).—Boiling point above 300° C.
Specific gravity 1·077 at 15° C.
Flash-point 350° Fahr.
Viscosity η 0·0881, η 140°, 0·0221.

Soft Pitch.—Bends at ordinary temperatures.
Free carbon, 4 to 5 per cent.

Hard Pitch.—Brittle.
Free carbon, 12 to 28 per cent.

(Signed) Dr. George Young, Ph.D., F.I.C., F.R.S.E.

Manchester University Lectures.—In the "Journal" for the 16th ult. (p. 775)), we gave the programme for the current session of the Manchester and District Junior Gas Association. It was stated therein that Mr. Jacques Abady would give on the 1st prox. the second University Lecture; his subject being "Illumination." We learn from the Hon. Secretary (Mr. J. Bridge, of Stretford) that, owing to ill-health, Mr. Abady will not be able to fulfil his promise; but that Mr. H. James Yates, F.C.S., will deliver the second lecture on the 15th prox., when he will deal with "Recent Progress in Gas-Fire Science."

Remarkable Disappearance of Dr. Rudolf Diesel.—Engineering circles were startled last Wednesday morning by the announcement of the disappearance of Dr. Rudolf Diesel, the inventor of the oil-engine bearing his name. He had been to Ghent, and was returning to London by the Antwerp-Harwich route, with two friends, on Monday night last week, to attend the meeting of the Consolidated Diesel Engine Manufacturers, Limited, on Wednesday. They were all together till about ten o'clock, when Dr. Diesel retired to his cabin. When the steamer was nearing Harwich in the morning, however, he could not be found; and his cabin had not been used for sleeping. He was seen on deck shortly after parting with his friends; and the supposition is that he fell overboard. It appears that he had lately been suffering greatly from insomnia. He was born in Paris of German parents, and was fifty-six years of age.

GAS-ENGINE TESTING.

The weekly informal discussion evenings of the Junior Institution of Engineers were resumed last Friday, when Mr. W. A. TOOKEY (the Vice-Chairman) lectured on the above subject at the offices of the Institution.

After referring to the usual objects in view when tests are conducted upon internal combustion engines, Mr. Tookey proceeded to deal in a practical manner with the use and limitations of various kinds of apparatus for determining the power transmitted, such as rope and "Prony" brakes, water dynamometers, fan dynamometers, direct-coupled and belt-driven dynamos generating current absorbed in water resistances or wire resistances, electrical torque measuring devices, &c.

The lecturer mentioned that when engines were being tested on behalf of purchasers, the main objects in view were to determine whether the specified power could be maintained throughout a stipulated period of time; to measure the fuel consumption of the engine in terms of brake-horse-power per hour; to note the speed variations at various loads—say full, half, three-quarter, and no load; to judge, from the position of the governor sleeve in relation to its maximum and minimum movement, whether or not a margin of power exists when the engine is working under full load; and to observe the momentary and permanent speed variations when the full load is suddenly thrown on and off. But, he said, such tests as these presupposed that preliminary tests had been carried out by the makers, in order that at the time of the official trial the engine would be shown in its best condition. It was with respect to the "tuning-up" tests that engineers, as such, were mainly concerned.

The usual procedure of testing in a makers' works was to prove that each engine, before its despatch, was capable of giving the "list" output with a margin in hand. Such tests resolved themselves into "tuning-up" trials, having regard merely to the attainment of such mean effective pressures behind the piston as would enable the brake-horse-power desired to be carried. These mean effective pressures had been the basis upon which the designer had originally prepared his drawings, and in this country were usually in the neighbourhood of 80 lbs. per square inch. Therefore, the tester contented himself, in the majority of instances, with so setting the valves, the timing device, and the gas and air adjustments, that this mean effective pressure was reached. In the ordinary course of things, this attention was all that was really needed; but when, in addition to the output of power, it was desired to obtain this with the utmost efficiency, much more had to be done. The object of the tester, then, was to secure the conversion into useful work of as much of the heat contained in the fuel as was possible, which meant that he should know not merely the amount of heat supplied in terms of brake-horse-power per hour, but the quantity entering the cylinder at each cycle—in other words, the mixture strength.

Once the charge in an internal combustion engine had been ignited, the engineer had no further control. The tester's sole care, therefore, must be to give such previous treatment to the charge that combustion shall proceed in a manner which ensures highly efficient results. He must adjust the gas and air regulating devices so that not only the proper proportion of one to the other shall be admitted, but admitted at such velocities that the two ingredients are properly and effectively mixed. He must control the amount of water flowing through the jackets of the engine so that no undue cooling shall cause excessive friction of the piston at the inner end of the liner where the heat is greatest, while obtaining that rate of heat transmission through the cylinder walls which ensures that the combustible charge, by contact with the hot walls and by the heat generated by compression, shall not reach a temperature before ignition which would be likely to cause spontaneous combustion and set up "pre-ignition." With regard to the latter, the lecturer's experience went to show that in the majority of instances pre-ignition could be cured by proper adjustment of the time of firing, and the proper time of firing varied with the strength of the mixture admitted. In his opinion, it was absolutely essential that the tester should know the mixture strength with which the engine was supplied; and to determine this it was necessary to meter the gas, and to be able to refer to a recording calorimeter which showed at a glance the average calorific value of the gas passing through it.

Mr. Tookey then referred in greater detail to the influence of mixture strength upon the thermal efficiency of internal combustion engines; illustrating his remarks by references to results of many tests which he has made during recent years in makers' works, and particularly to a series of more than 700 tests with engines using town gas in the London district. He showed that the usual method of referring to the mixture strength—*i.e.*, as so many parts of air to one part of gas—was likely to be misleading, and was of no value for the purpose of comparing the performances of engines. He gave particulars of the method that he had adopted in order to obtain a standard of comparison of mixture strength when taking the whole of the working fluid, gas, air, and residuals into account, and explained how it was possible to express the mean pressure obtained as a factor of the mixture strength. He then referred to the use of this factor in "tuning-up," and gave instances where considerable improvement had been made in the performances as suggested by its comparative value. Following this, he spoke again of the manner in which pre-ignitions could be guarded against, and gave it as his opinion that the overload capacity of gas-engines—beyond the normal rating of 80 lbs. per square inch mean pressure—could be increased to as much as 90 or 95 lbs., and be carried for long periods by suitably adjusting the ignition to suit the increased mixture strength, provided that no great change took place in the calorific value of the gas used, or in its chemical composition.

In conclusion, Mr. Tookey said the whole secret of "tuning-up" lay in the acceptance by the tester of the fact that the mixture strength, cylinder-wall temperature, and timing of ignition should be correlated, so that combustion should proceed swiftly and completely, but not violently.

SCOTTISH JUNIOR GAS ASSOCIATION.

WESTERN DISTRICT.

Opening of the Tenth Session.

The Opening Meeting of the Tenth Session of the Scottish Junior Gas Association (Western District) was held in the Royal Technical College, George Street, Glasgow, on Saturday.

Mr. F. L. MACLAREN (Dumbarton), the retiring President, who occupied the chair at the commencement of the proceedings, said it was a great pleasure to welcome so large a gathering of the members of the Association to hear the address of their new President, Mr. John Wilson, of Falkirk.

The HON. SECRETARY (Mr. David Fulton, of Helensburgh) mentioned that the Council had admitted to the Association nineteen new members. With regard to their visit to London, the Council were very sorry to intimate that no cheap fares had been granted in connection with the visit to the National Gas Exhibition; but the Council had arranged to carry it out, and those members who desired to go would leave Glasgow at ten o'clock on Friday, the 17th inst. He hoped those who intended making the visit would notify the Secretary as soon as possible, so that he might be able to book hotel accommodation for them in London. The judges of the papers for the coming session had been selected that night. They were: The President, in virtue of his office, and Messrs. J. M'Gee (Glasgow), J. Bell (Kirkintilloch), J. Webster (Provan), and Alexander Wilson (Glasgow).

Mr. JOHN WILSON then took the chair, and before delivering his address, said he thought it was only right that they should acknowledge the great services which Mr. MacLaren had rendered during the last session. He was always at his post, and conducted the affairs of the Association as well as, or better than, they had ever been conducted before.

A hearty vote of thanks was accorded to Mr. MacLaren.

The PRESIDENT then delivered the following

INAUGURAL ADDRESS.

In preparing an address, it is just a little difficult to hit on a suitable subject, especially at the present time, when so much is being made of centenary and jubilee exhibitions, &c. But as I have recently been in close contact with rather an exceptional piece of work (at any rate, in connection with gas-works), I decided to put these experiences before you in the form of a short paper, as being perhaps well suited to a Junior Association such as ours, ever on the thirst as we are (or should be) for knowledge. I will therefore bring forward for your notice some remarks on "The Underpinning of a Retort-Bench."

The bench in question was built in 1904; and on Aug. 29, 1905, being suspicious of its stability, levels were taken of the carrying beams of the stage floor on the charging side. These readings showed a distinct subsidence (in some places of as much as five inches) from the original level of the beams—rather a disturbing state of matters. On Aug. 21, 1906, the levels were again taken, and a still further subsidence was found. The levels were once more taken on May 20, 1907; and it was then found that, in most cases, the rate of sinking had been very much reduced. From the appearance and working of the retort-bench, it was thought that the foundations had at last found a bottom, and that no further trouble would be encountered. Unfortunately, during the winter of 1912-13 the effect of a still further subsidence began to make itself apparent; and on the levels being taken on Feb. 26, 1913, it was discovered that the bench had again begun to sink.

Subsequent readings, taken on April 1 and May 14, demonstrated the fact that the foundation was in a state of unrest, as the records varied, sometimes up and sometimes down, from the preceding ones. Cracks had by this time made their appearance in the concrete foundation; and ultimately matters became so serious that something had to be done. It was decided first to sink six bores round the retort-bench, to ascertain the quality of the material on which the foundation had been laid.

A trial pit was then dug on the east side of the retort-house, and far enough away from the wall to ensure its safety, in case there might be a run in. At a depth of approximately 13 feet we came across a layer of good stiff brown clay containing several fair-sized boulders through it. This we were advised was the boulder clay bed of Scotland. A test was made in order to find the carrying power of the bed at this point, and was proceeded with in the following manner.

An old tar-tower, consisting of a cast-iron pipe 3 ft. 6 in. in diameter, with a solid bottom, was up-ended into the hole; a thin

layer of ashes being placed between it and the clay. This had to be done, as there were several boulders projecting above the surface of the bed. The pipe was then filled with water to increase the weight, and a platform laid over the mouth consisting of H beams. We then loaded up the structure with pig iron until we reached a pressure on the clay of 2½ tons per square foot. Allowing for the slight settling and squeezing of the ashes, the bed of clay did not yield under this pressure. Measurements taken from time to time, by means of a level from a datum line on the retort-house wall, proved this. As the tower and superstructure were left standing for several days without showing any tendency to sink, we were satisfied that the boulder clay bed was quite capable of carrying the weight of the retort-bench.

As the boulder clay was about 9 feet below the underside of the existing foundation of the retort-bench, the advisability of underpinning the old foundation was taken into careful consideration. Ultimately it was decided to go ahead with the work; and on June 30 a start was made with the first hole. We began at the extreme south end of the retort-bench.

A pit about 5 feet broad and 3 ft. 6 in. out from the foundation was sunk, carrying it right down to the boulder clay strata. Owing to the extremely treacherous nature of the material above the boulder bed, we had to timber each hole very carefully, to prevent the sides coming in on top of the men when working. Then 3 feet of concrete was dumped into the hole, to form a toe for the new foundation, and to keep the front of the opening thoroughly secure. We next started excavating below the existing foundation, mining in for 8 feet from the face, and going down half-way—that is to say, a hole about 5 feet broad by 4 ft. 6 in. deep and 8 feet long. This was well timbered, using polling boards 9 in. by 1½ in. by 3 ft. 6 in. long, the walings and rances being of 9 in. by 3 in. battens.

The lower part of the hole was taken out until the boulder clay level was reached. About 3 inches of the top of the bed was removed, and the surface scraped and cleaned ready for the concrete. No time was lost in getting the concrete into the hole after the last portion had been taken out, in order to prevent the bottom sides from breaking in, as this lower half was not timbered at all.

In carrying out work of this nature, it is compulsory that everything should be in readiness to bring the work to completion without undue stoppages. We always made it a point to have sufficient broken brick, sand, and cement brought forward, so that as soon as the hole was ready for the concrete a start was made concreting; and batch after batch was flung into the hole until the 3-feet mark was reached—one batch being mixed and turned over while the previous one was being dumped into the hole. Thus as little time as possible was lost.

The concrete was made up about 3 feet thick. This was then covered with boards, to enable the men to shovel forward the material when cutting out the second portion of the hole. Another 8 feet were then mined out on the top level, and well timbered up, as before. We now went down once more to the boulder clay, and, after cleaning the bottom, filled up to the 3-feet mark with concrete. As the existing foundation was 23 ft. 6 in. broad, we were left with 7 ft. 6 in. of material still to take out to complete the excavation for the first pillar. This was done in similar fashion to the first two portions, and concrete filled in 3 feet thick, so that we had a 3-feet bed of concrete right along the bottom. More concrete was then put in at the back of the hole, and raised up to within 3 feet of the underside of the old foundation; the mass being brought forward at this level to the front of the hole, and right across the pit at the face.

The flooring boards placed over the top front portions of the initial layer of concrete were, of course, removed, as the mass of concrete gradually worked its way forward; but the polling boards, walings, and rances were still kept in position, the concrete covering the lower ends of the polling boards. The concrete, after being well dumped and beaten down to a level surface, was left to set. In about twelve hours, it was sufficiently hard to allow the bricklayer to make a start. He began at the far end of the hole, and built up the remaining 3 feet space with common hard brick laid with cement mortar, to within 3 inches of the underside of the old foundation.

To key up this intervening space between the existing foundation and the new part, hard feather-end bricks were used; one brick being bedded with the butt or thick end farthest away from the builder. Another bed of cement was spread over the brick, and the second feather-end brick was entered between the first one and the underside of the existing foundation. The bricklayer, after knocking it in so far, gave place to his labourer, who drove it home with a fore-hammer; the bricklayer holding an oak dolly as driver. The feather-ends, when in position, formed a square; and using, as we did, plenty of cement, the surplus was forced up into the existing foundation, making a satisfactory and tight job. The bricklayer worked his way forward until he reached the front face of the foundation, when he squared off his wall flush with the side, thus completing the first pillar.

In coming back, he removed the walings and rances, as required. The lower ends of the polling boards being buried in the concrete, they could not be dislodged, so were just left in until the adjacent hole should be opened up, when the boards would be recovered. This being the first pillar, it naturally took more time than had been allowed—practically four days having been required in excavating and concreting, while a further three days were necessary to complete the brickwork. This was to be expected; but once the men got accustomed to the work, we managed to cut down the time as well as increase the size of the holes.

The second pillar was placed at the extreme north end—at the opposite end from the first pillar. It will scarcely be necessary for me to describe each pillar in detail, as all the pillars are practically similar in construction; so I will content myself with drawing your attention to any differences that occurred, which may be of interest. In this second pillar, we discovered a 6-inch field drain running right through the hole, and at right angles to the main foundation. The second pillar took practically the same time to clean out and concrete; but the brickwork was completed a day sooner than that of the first one. The third pillar was placed, roughly speaking, a quarter distance from the first. The fourth pillar was placed midway between the second and third. A 3-inch field drain was discovered in this hole.

The time taken for this hole was rather longer than the average. This is explained by the fact that the ovens immediately above the hole were on full work, and the heat descending right through the concrete raised the temperature of the clay to steaming-point. The men could only stay in and work for five or ten minutes at a time; the vapours rising from the hot clay having a sickening effect, which caused them no little annoyance. After the top layer had been cleared, the lower portion did not give nearly so much trouble, as the men's heads were by this time away from the zone of heat. At this stage, we brought a Westinghouse compressor from our sulphate-house, and fixed it up at the end of the retort-bench, in order to blow air into the hot hole while the men were working. This relieved them considerably, and allowed them to work in comparative comfort. Once the front portion had been taken out, the worst was really past, as we now worked underneath the top layer of the second portion, and brought it down from the bottom; thus keeping the heads of the men fairly low down, and allowing the sweet air to dispel the rank at the top of the hole.

The question may be in your minds as to why we did not work from both sides of the bench towards the middle. This was quite impossible, however, as the east side was always in use for the removal of the coke and the cleaning of the producer fires, which are all on this side. We managed, however, to sink an air shaft 3 feet square to below the level of the underside of the existing foundation, and carried a vent through into the back end of the hole, so as to procure a straight current of air through the hole.

Incidentally it may be mentioned that we had threatened strikes at this point; but the extra money asked, in the circumstances, was not grudged. Once the clay had been removed, and the concrete was in position, the bricklayer suffered no inconvenience in working, because, though still rather warm, the offensive vapours had been entirely eliminated by the removal of the clay. In order to provide a current of cold air, when working at the two adjacent holes, the bricklayer left out a few courses of bricks on either side of the pillar. This was found to be of great benefit when the adjoining holes came to be opened up.

The fifth pillar came between the first and third pillars. The sixth pillar lay between the second and fourth, while the seventh came between the third and fourth. A 3-inch field drain was found in this hole. As you can see, we had now seven good pillars spaced out under the foundation, so that the boulder clay was taking a fair share of the weight of the retort-bench. Two squads of men were now engaged, so that we began working on two holes at one time, both day and night. The eighth hole was taken out alongside the first pillar, which had been standing for practically 29 days. This gave us a good chance of making an examination of the first pillar, and we were thoroughly satisfied with its condition. It rang like a bell on being struck; and the side view thus afforded showed that the feather-end bricks had been well knocked home solid to the old foundation. A 3-inch drain was encountered here.

The ninth pillar came between the third and fourth. The tenth pillar came between the fourth and sixth, and was also a warm hole, though not so bad as number four. Pillar No. 11 came adjacent to No. 2, being at the extreme north end of the bench. No. 2 pillar was also found to be well built and finished off, as seen from the side. The twelfth pillar was made between the fourth and seventh, and was a little warm also. No. 13 came between Nos. 5 and 8, and No. 14 between Nos. 6 and 11. A 3-inch drain had to be cut off here. This finished all the pillars necessary. Any further holes still to be opened to make a continuous foundation came between two pillars, and this did away with the necessity of further timbering. At this point we began recovering all the polling boards originally left in, with the exception of the two extreme outsides, which, of course, were left in altogether.

The worst was over; and though some of the remaining holes were very much wider than the main pillars, no anxiety was felt on this score, as the bench was fairly well supported on these main pillars, and, no timbering being necessary, it was just a case of cleaning out the intervening material and filling up with concrete—finishing off with brick, as before. The holes followed in rotation the main pillars which had been the longest standing, until the closing length was reached in hole No. 25, practically in the middle. This last was a very wide hole, measuring about 8 ft. 6 in. across. Field drains were encountered in holes Nos. 15, 17, and 23.

A large stone was found in the bottom of hole No. 19; being 3 ft. 9 in. by 2 ft. 9 in. in area, with the depth unknown. Another big boulder was discovered in the last hole, measuring 4 ft. by

1 ft. 6 in. in breadth. This was only part of it; the remainder being under the concrete in hole No. 13. In the nineteenth hole we found a big pothole of moss. Boulders were discovered in every hole, and were of whinstone, worn smooth, and oblong in shape. The largest surface of boulder was exposed in No. 19 hole. The moss was very irregular in level, forming a wavy line along the whole length of the bench. It was intermingled at all points with wood fibre and pieces of wood, which appear to have been bits of fallen trees. I believe the layer of moss was largely responsible for the bench sinking. In the event of a rainy period following on a dry spell, the moss would soak up the surface water and tend to swell, while on drying up again it would shrink and be squeezed flat by the weight of the retort-bench.

Then, again, the field drains had been left in under the buildings. These we found to be a great nuisance when digging out the main pillars, as, instead of working a hole 5 feet broad, on more than one occasion we came across a field drain close up the side, which, on being touched, brought the side down, so that we were forced, against our will, to make the hole wider. The dangerous nature of these drains decided us to run a 6-inch main drain outside all the buildings on the works, and on the side from which the field drains flowed, in order to catch them and divert the flow of water away from underneath the building foundation. About ten yards to the west of the purifier-house, a trench was dug, parallel with the length of the building, and at right angles to the run of the field drains. In the trench a 6-inch tile drain was laid, entering into the main sewer at its lower end; and each field drain was cut and turned into the 6-inch cross drain. This should certainly assist in keeping the foundations a little drier in the wet weather.

When it was first discovered that the bench was sinking, in order to lighten the weight somewhat the charging-side stage-floor was detached from the buckstays and mounted on columns placed opposite each stay. Now that the bench was on a good solid foundation, this floor was once more bracketed on to the buckstays, and the columns shifted in towards the middle, and placed below the outside rail on which the stoking machines ran. The foundations of these columns were carried down to the boulder bed. A hole 5 feet square was dug down to the clay bed, and was timbered, as usual. The bottom of the bed was filled with concrete about 3 feet up. On top of this, a hollow pier, 3 feet square (consisting of hard red bricks), was raised right to the ground level. These piers were afterwards filled up with concrete and made solid. The concrete used in all cases consisted of broken brick, sand, and cement, in the proportion of four of brick and two of sand to one of cement. The cement mortar was made of two of sand to one of cement.

The main pillars would vary from about 5 feet to 6 feet at the top, and were tapered down to 4 ft. 6 in. or 5 ft. 6 in. at the bottom, giving a batter of 3 inches each side. The main pillars became narrower towards the back. The filling-up spaces were, therefore, wide at the bottom and narrow at the top, and wide at the back and narrow at the front, or the converse of the main pillars. The pillars are thus dovetailed into each other both vertically and horizontally, and give in construction what might be termed a flat arch.

The cost of the whole job works out as follows.

Cost of Underpinning Retort-Bench, Altering Position of Columns and Running Field Drain.

	£	s.	d.
Wages	441	14	7
Cement—128¼ tons	266	12	9
Bricks—102,800 red bricks	138	15	8
20,330 feather-ends	58	9	0
2,000 scones	5	15	0
Sand	26	0	3
Cartages	65	10	6
Timber	32	2	2
Drain pipes	6	8	8
Rubble	0	17	0
Tools	4	13	0
Hire of stonebreaker	7	10	0
Broken bricks—350 loads	25	5	0
Light	5	16	0
	£1086	9	7

You will admit that this is a remarkably cheap price for so big an undertaking. It works out at approximately 19s. per cubic yard. We had the advantage, of course, that the work was done entirely by our own men, and the job was superintended by Mr. M'Kee, a burgh official.

Unfortunately, in work of this kind, once the ground has been re-instated there is nothing left to show that a difficult undertaking has been brought to a successful issue. Still, one has the comfortable feeling that the foundation is now on a sure basis, and as far as we can see no further trouble need be feared. The levels were taken along the foundation immediately after the first seven pillars had been put in; and on the job being completed the levels were again taken, the second set of readings tallying with the first—showing that the foundation had not moved during the process of underpinning.

I would like, before closing, to lay stress upon the extreme importance of having a good foundation upon which to build; and I think we, as juniors, should take this to heart, because it is not to be expected good results can be produced out of a retort-bench built on a groggy foundation.

DISCUSSION.

Mr. W. Wilson (Falkirk) said, as he as well as the President had had something to do with the work referred to, he thought possibly the members would excuse him if he spoke first. There were one or two matters on which the President had not dwelt. First of all, to those who were connected with gas manufacture he would point out the effect of the subsidence of the retort-bench. With this breaking its back as it did, it naturally racked the brickwork of the setting. Consequently, they had leaky retorts and furnace arches going down. They had air being drawn in at the dummy arches—air going in at the wrong places. Their hydraulic mains gave them no end of trouble. In 1904-5, during the first sinkage, they had had an enormous amount of trouble with their hydraulic mains. These were in sections, one about 33 feet long being carried over three ovens; consequently there were four sections in the length of the bench—four on one side and four on the other. These sections were connected to a tar-tower, and the whole of the seals were regulated by the valve at the tower. With the hydraulic mains settling down, they discovered they had no seal at the one end and 5 inches at the other. Why the foundations were not put right in the first instance, he was unable to say. The clay on the surface was apparently very good, and it was fairly good down for 3 or 4 feet. After this they had cuts very soft indeed, and it was like soft butter. The mass itself was quite soft, and the layer varied in thickness. It was only 3 inches thick at the one end of the bench, and 12 inches at the other. Then their stoking-machines, when loaded, weighed perhaps altogether about 20 or 25 tons. These machines bounding along, driven by energetic stokers, caused vibration, which was very perceptible. When the machines moved, the whole thing shook. Since the underpinning process, the shaking had ceased; showing that they had done something. He might say that the weight per square foot on the foundation of the retort-bench as originally built worked out at 18¼ cwt. between brickwork, ironwork, and the proportion of the weight of the coal-hoppers, which bore partly upon the retort structure and partly upon the walls. But now they had reached a foundation on the bed of clay which could carry 2½ tons per square foot. When the bricklayer was building, he laid the bricks all "headers"—there was no bonding. He had to work practically on his knees in a tunnel. They relied entirely upon the binding properties of the cement mortar to join up the one pillar with the other. They had no doubt whatever that the whole thing would be bonded right from end to end. In view of their boring operations, he had to look up some geological matters. It was very interesting to learn the history of the boulder beds. The clay itself was red, and the boulders were blue. Geologists informed them that these boulders had been borne from the sides of the mountains in the Glacial period, and carried hundreds of miles by the glaciers. When these melted, the boulders, worn smooth, were deposited in their present positions. He believed they found in the clay beds in Yorkshire boulders that had been borne from the mountains in Scandinavia. The boulders they found were supposed to have been borne from the Grampians in Invernesshire. The original foundation at Falkirk was 3 ft. 3 in. at the one end, and 3 ft. 9 in. at the other. A thickness of concrete like this was much stronger than the usual thing; showing that his predecessor had some doubt about the foundations. He might say that one thing which astonished them in connection with the subsidence was the fact that their large chimney-stack at the south end of the bench showed no signs of subsiding. The weight per square foot on the foundations of the chimney must be four or five times greater than anything they had on the retort-bench. They discovered that the foundations of the chimney had been taken down to the boulder bed. He thought the President had excelled in putting the matter before them as he had done.

Mr. Alex. Wilson (Glasgow) said he had been very much interested in the paper. He had some little knowledge of the work referred to, because he had been called in in 1907 to see what could be done regarding the sinkage of the bench, before Mr. William Wilson took charge of the works. He got hold of the bores that had been put down before the work was started. He was quite aware of the bed of moss that was underneath; and those who put down the works must also have been aware of it. It was a very risky thing to erect a heavy structure like a retort-bench on the top of a layer of moss. The sinkage had been steady for a considerable time before he was called in. He had levels taken at once, and taken regularly for a considerable time, and the records kept. The rate of sinkage got so low that, instead of going to a large expenditure, he advised them at that time to allow the bench to remain. Apparently some new force—possibly extra quantities of water getting into the soil, or possibly the vibration due to the working of the stoking-machines—had come that last year; and the rate of sinkage, which had practically stopped, commenced again. He had had a talk with Mr. Wilson over the matter, and he thought he was quite justified in advising his Committee to have the underpinning carried out. After he got the bores showing the bed of boulder clay, it was quite worth while going to the expense of the underpinning, so that the bench could be made secure practically for all time; otherwise there would have been a considerable amount of danger in the working. He had been quite interested in the way in which the work had been carried out. It did not fall to the lot of many of them, even in

large works, to have such an experience; and they would all learn something from it.

Messrs. CARMICHAEL (Glasgow), SMITH (Glasgow), and FRAZER (Glasgow) contributed a few observations to the discussion, complimenting the President on his valuable address.

The PRESIDENT, in reply, humorously remarked that it should have been announced as "by the Messrs. Wilson."

APPLICATIONS FOR LETTERS PATENT.

21,355.—WILLIAMS, H., "Supply regulators." Sept. 22.
21,375.—RASCH, L., "Gas-meters." Sept. 22.
21,376.—RASCH, L., "Regulating gas supply to fires." Sept. 22.
21,427.—THEISEN, H. E., "Purifying gases." Sept. 23.
21,446.—HOWARD, A. J., "Carrying and protecting pipes" Sept. 23.
21,458.—DEUTSCHE GASGLÜHLICHT AKT.-GES., "Inverted burners." Sept. 23.
21,466.—FLETCHER, T. W., and FLETCHER, RUSSELL, AND CO., LTD., "Gas cooking-stoves." Sept. 23.
21,467.—COMPAGNIE POUR LA FABRICATION DES COMPTEURS ET MATÉRIEL D'USINES À GAZ, "Distributor meters for liquid." Sept. 23.
21,495.—WILSON, W. A., and DAVIES, H., "Gas-fires." Sept. 24.
21,515.—POND, H. G., "Welded joints for pipes." Sept. 24.
21,616.—KNIGHT, P. E., "Lighting burners from a distance." Sept. 25.
21,626-7.—HUME, W. R., "Pipes." Sept. 25.
21,644.—COOPER, C. E., "Valves or cocks." Sept. 25.
21,697.—STEWART, J., "Gas-producers." Sept. 26.
21,706.—WILSON, W. A., and DAVIES, H., "Burners for the production of a silent flame." Sept. 26.
21,711.—ROTHERHAM, E, "Anti-vibrator." Sept. 26.
21,728.—WOOD, W. H., and EDWARDS, A. N., "Inverted burners." Sept. 26.
21,746.—KILLAR, C. F., "Mantles." Sept. 26.
21,765.—GUNNING, J., "Time-controlled gas tappets." Sept. 26.

Proposed Independent Gas Supply for Thornaby-on-Tees.

For a considerable time the ratepayers of Thornaby-on-Tees have been agitating in favour of erecting gas-works in the town and undertaking their own gas supply, which is at present in the hands of the Stockton Corporation. The question has been raised chiefly because the gas consumers in Thornaby have been charged at a higher rate than those in Stockton, and also because they consider that the Gas Department are making too large a profit from the gas undertaking. The annual consumption of gas in Thornaby is about 70 million cubic feet; and it is asserted that with its own works the town could supply gas at a lower price than that now charged by Stockton. At a meeting of the Thornaby Corporation on Wednesday last, it was unanimously decided to give notice of their intended application for parliamentary powers to erect gas-works in the borough, and also to enable them to purchase coke-oven gas in bulk. The Corporation of Thornaby, who are being advised by Mr. A. Morton Fyffe, of Nelson, have two schemes before them—one for the erection of complete gas-works; and the other for the purchase of coke-oven gas in bulk, on similar lines to the scheme recently adopted by the adjoining borough of Middlesbrough. Stockton will in all probability oppose the granting of such powers to Thornaby. The matter at issue will be of interest to the gas profession generally, as the ever-recurring questions of charges to outside areas and profit from gas undertakings will be involved.

Birmingham Corporation Gas-Meter Contracts.—The special resolution, asking for a Committee of Inquiry into the whole business of the gas-meter contracts, which stood in the name of Mr. Stevens on the *agenda* for the meeting of the Birmingham City Council last Wednesday, and given in the "JOURNAL" for the 30th ult. (p. 946), was held over till the next meeting.

Dublin Labour Troubles Affect the Gas Company.—The prevailing labour trouble in Dublin has extended to the Gas Company. Last Thursday, a large gas-cooker was got ready at the Company's stores for delivery to a firm in the city; but when it came to loading it on the delivery van the workmen refused to handle it. They were told that there was nothing for them to do but to leave, which they did; and the whole staff of unskilled workmen, numbering about 40, left their employment.

Defective Electric Lighting in the Tipperary Workhouse.—At a recent meeting of the Tipperary Board of Guardians, attention was drawn to the fact that there had been a failure of the electric lighting in the workhouse and its offices for fully three weeks. The installation, said Mr. Heffernan, had been there for twelve months, and it was scandalous that the whole institution should be left in such a predicament. In the discussion, the failure was attributed to the quality of the anthracite coal supplied. Mr. Heffernan said it was clear that the whole installation had been a failure. It was agreed that a conference on the subject with the contractors' representatives should be held.

Ossett Gas-Works Extensions.—An application by the Ossett Corporation for sanction to borrow £40,000 for the purpose of extending the gas works was the subject of an inquiry held at the Town Hall on Thursday last, by Mr. T. C. Ekin, M.Inst.C.E., one of the Board's Inspectors. Particulars of the scheme have already been given in the "JOURNAL." Apart from the explanation of its details, the proceedings were made interesting by the fact that two or three ratepayers criticized and to some extent opposed, the project—a somewhat lively discussion ensuing. The case for the Corporation was presented by Mr. B. Greenwood, Solicitor, and the Gas Engineer and Manager (Mr. A. E. Mottram); and a representative of Messrs. Leech, Goodall, and Co., of Leeds, who, it may be remembered, have secured the contract for an installation of Dessau vertical retorts, was also in attendance. The proceedings will be more fully noticed next week.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Exit of Electra House.

SIR,—I notice in your current issue an obituary notice regarding Electra House, and as the article contains many misstatements, I trust that, with your usual fairness, you will give equal publicity to this letter, which states the facts as they existed.

Taken in the order in which they appear in your article, the chief inaccuracies are contained in the following statements:—

1.—The South Metropolitan Electric Light Company determined to copy their opponents.
2.—Electra House adjoined the "Gas House."
3.—The South Metropolitan Electric Light Company became the tenants.
4.—Several months ago the Company closed Electra House and gave up the tenancy.
5.—Its mission had failed.
6.—Its cost brought an insufficient return to justify its continuance.
7.—The Company left all the equipment there.
8.—The public neglect made Electra House a white elephant.

Dealing with the above statements *seriatim*, the facts are as follows.

1.—The idea of Electra House originated in my own mind many months before the Gas Company opened their show house; but it was only upon learning of the Gas Company's intention that the exact locality of Electra House was determined. The scheme was in no sense a "copy," since the Gas House was unoccupied, but furnished as an advertisement by local traders, its untenanted rooms fitted up to show off the applications of gas. Electra House, on the other hand, was a private residence, actually in occupation by a family in the ordinary way, but open for public inspection.

2.—Electra House did not adjoin the Gas House, but was separated from it by a road and another private residence whose owner was a user of electric light, who refused to employ gas lighting in spite of the South Metropolitan Gas Company's offer to supply free gas-fittings selected from their showrooms.

3.—The South Metropolitan Electric Light Company did not become the tenants of Electra House, and were never the tenants. I applied for the tenancy as a private resident, and signed an agreement in the usual form for three years, paying the ordinary rent direct to the landlord. I have this agreement by me, and should be pleased to produce it for your inspection. It differs in no way from any other signed by residents on the estate. I am not, and never was, connected with the South Metropolitan Electric Light Company, except during the run of my scheme at Electra House. The idea of throwing open my own house to public inspection was not the Company's idea, but mine. The installation was planned by me; the house named by me; the fittings and equipment were put in by me to my own selection; my furniture was used, and the Company had nothing to do with it beyond the fact that I allowed them to send visitors to inspect the house and its equipment. For this I received remuneration that did not so much as pay my expenses; and although I admit that such an arrangement could not be defended as a business proposition, it was purely a private matter between the Company and myself. I hold receipts for current supplied—a sufficient refutation of the popular belief that I enjoyed a free supply.

4.—The Company did not give up their tenancy, as they were never the tenants. Having completed my three years' occupancy, which was all I had bargained to do, I removed to another district. The Company invited me by letter to continue the arrangement beyond the three years; but I declined to do so, as both my wife and myself had grown tired of being deprived of all privacy in our home, and of being unable to go out when we desired.

5.—The mission of Electra House had not failed in any shape or form, as is clearly shown by the progress made by the South Metropolitan Electric Light Company since I initiated the scheme.

6.—This is partly answered by the above. The cost to the Company was trifling so long as I continued my tenancy, and a much smaller return than was actually secured would have justified the continuance of the enterprise.

7.—The Company did not leave all the equipment there. They never owned any of the equipment beyond meters, cable, and so forth, the remainder having been installed by me. A few special lighting fittings, more or less fixtures in character, were, however, sold by me to the landlord; and these, no doubt, inspired the statement. The remainder I removed when giving up the tenancy, together with my furniture.

8.—The public did not neglect Electra House. The visitors' books contain names and addresses of many thousand callers, the number during the three years exceeding 30,000. Unlike the Gas House, my front door was kept closed, and only those who rang the bell and asked to inspect the house were admitted. Casual passers-by were not encouraged to enter; and my energies were centred upon demonstrating the apparatus and giving information to those visitors whom the Company desired as consumers, and their application for admission presupposed their interest in the domestic uses of electricity.

Electra House was a one-man show—a genuine electric home. My present house is equipped on somewhat similar lines, but is not available for public inspection.

It is true that the Company might have taken over the tenancy. But, while I hold no brief for them, I can well imagine that they hesitated to refurnish the house, equip it with apparatus to replace that which I removed, and face the difficulty of securing the services of competent successors to my wife and self; while it must be remembered that the Company now possess comprehensive showrooms which no doubt they deem sufficient to meet their needs.

It is true, I believe, that the new tenant is to use gas. But the fact—if it be a fact—that the electric wiring (which is concealed throughout

the house, and therefore in nobody's way) is being pulled out arouses suspicions that he is not altogether a free agent in the matter; and these are strengthened by the rapidity with which his advent has received publicity in the gas press.

THE (LATE) TENANT OF ELECTRA HOUSE.

London, W.C., Sept. 30, 1913.

[We do not propose to discuss the letter of our correspondent, the main points of which appear to be that he was the tenant of Electra House, that the idea originated in his brain, that the South Metropolitan Electric Supply Company entered into an arrangement with him whereby his home was converted into a show-place—at a price—and that he has ceased pursuing the arrangement in his new home. Upon the last-named fact we heartily congratulate him and those who live under his roof. Now as to the main part of our offence in giving the South Metropolitan Electric Supply Company credit for the idea, and ascribing to them the tenancy of the house. An invitation card in our possession, with Electra House address at the top, reads: "The Chairman and Directors of the South Metropolitan Electric Light and Power Company, Limited, have the pleasure to invite..... on Thursday, Nov. 25, 1909, to a private view of the Model Electric Home, which is about to be opened at the above address as a permanent exhibition of the domestic applications of electricity. Light refreshments, prepared electrically, will be served between 3 and 7 p.m. R.S.V.P." The permanency of the exhibition requires no comment. Then type-written notes attached to the invitation card inform us that "the South Metropolitan Electric Light and Power Company *has opened* this model electric home as a permanent exhibition." Attached to the notes is a list of some 35 electrical firms "who have supplied goods." We rather fancy, too, it is correct to say that Messrs. Sainsbury, of Lewisham, sent in the furniture, or at any rate some of it. On Dec. 1, 1909, "Electrical Industries," in noticing the Catford Electric Home, gave the South Metropolitan Electric Supply and Light Company first credit for the idea of such places in connection with a house at Hither Green. The article proceeds to state that on the previous Thursday a number of press representatives accepted the Company's invitation to the "electrical house warming." The before-mentioned list of firms who supplied the goods follows; and the article concludes: "We heartily congratulate the South Metropolitan Electric Light and Power Company upon its enterprise *in opening* this second permanent electric home exhibition." The same paper on May 25, 1910, remarked: "Electrical men will call to mind the enterprise of the South Metropolitan Electric Light and Power Company *in establishing* the Model 'Electric Home' at Catford," &c. The "Electrical Times" on Dec. 2, 1909, referring to the subject, remarked: "A new departure in publicity has just been made by the South Metropolitan Electric Light and Power Company." The "Electrical Review" next day also congratulated the Company upon the efforts "they are making to educate the residents," and so on. On Sept. 8, 1910, the "Electrical Times," reverting to the subject, said: "The South Metropolitan Electric Light and Power Company seems to have set the fashion in the way of up-to-date and practical publicity methods. *Its* model electric home at Catford—'Electra House'—has attracted visitors from all parts of London." We need not argue with our correspondent. He will see we had the authority of an invitation card and the Electrical Press for giving the honour of the Electra House scheme to the South Metropolitan Electric Supply Company; and, if he wishes us to do so, we shall be pleased to print the list of firms to whom was ascribed the privilege of having supplied the fittings. We do not observe in the electrical papers of 1909 or 1910 a letter from our correspondent correcting their statements as quoted above, nor claiming the authorship of the idea of making his home—the house that he, as a matter of fact, himself rented—a show place for payment.—ED. J.G.L.]

Alliance and Dublin Gas Company.

SIR,—Being a shareholder in the above Company, I am interested in the correspondence that is appearing relative to the same.

In your issue for Sept. 30 appears a letter under the *nom de plume* "Nonulus;" and I beg leave to draw attention to the latter portion of his communication, where he gives some particulars relative to consumption and revenue for gas for the half years to Dec. 31, 1911 and 1912. He states that while the accounts for December, 1912, show an increase of 11,105,000 cubic feet, the gas revenue shows a reduction of £2783 14s. 4d. I have gone into the figures of "Nonulus;" and while he is correct in giving the increase of gas as 11,105,000 cubic feet, he is wrong in the statement of the decrease named—of £2783 14s. 4d. This, on the other hand, is an increase of £2841 14s. for December, 1912. The figures I think "Nonulus" has taken from the balance-sheets are as follows:—

	£	s.	d.
Gas and public lighting, December, 1911	95,536	6	7
" " " 1912	92,752	10	3
Showing a decrease of	2,783	16	4

and not £2783 14s. 4d. as stated by "Nonulus."

I think, however, that here occurs the error. The above items do not represent the full gas revenue for the half years in question, as "Nonulus" has omitted to account for the gas revenue from the coin-meters, which is given in the balance-sheets as follows:—

	£	s.	d.
December, 1912	39,058	6	4
" 1911	33,432	16	0
Showing an increase of	5,625	10	4

under the head of coin-meters for December, 1912.

From these figures, if we deduct the decrease previously shown, we arrive at the following figures:—

	£	s.	d.
Increase, coin-meters	5,625	10	4
Decrease, ordinary consumers and public lamps .	2,783	16	4
Giving a net increase of . . .	2,841	14	0

as previously stated, and also corroborated by the following figures from the balance-sheets for the half years December, 1912 and 1911, as follows:—

Gas sold, December, 1912				746,943,000	cubic feet.	
" " 1911				735,838,000	"	"
Increase, December, 1912				11,105,000	"	"
	£	s.	d.	£	s.	d.
Gas sold, December, 1912—						
Ordinary consumers and public lamps	92,752	10	3			
Coin-meters	39,058	6	4			
				131,810	16	7
Gas sold, December, 1911—						
Ordinary consumers and public lamps	95,536	6	7			
Coin-meters	33,432	16	0			
				128,969	2	7
Net increase in gas revenue, December, 1912				£2,841	14	0

I trust "Nonulus" will kindly check these figures.

Lane House, Helmshore, Lancs., Oct. 3, 1913. R. V. S. HOUGHTON.

SIR,—I have had an opportunity of perusing a press account of the recent stockholders' half-yearly meeting, held in Dublin; and I notice that, while the Directors have not attempted to offer any satisfactory explanation to the stockholders, their attitude was entirely of a defensive nature, and that the net outcome was a tardy promise to permit an investigation of the Company's affairs by an independent expert, but with the proviso that such expert should be one approved by the Board. If this latter condition is unreasonably insisted upon, the investigation, which is now of an extremely pressing nature, might be delayed indefinitely. I, therefore, hope that such will not be the case; but the Stockholders' Committee would be wise to keep this point in mind, especially having regard to the remarks of the Chairman—viz., "The appointment of an expert must . . . form the subject of further negotiations. . . ."

I trust those stockholders who are included in the Special Committee, and are conducting an inquiry with the aid of an expert, will not be satisfied until it has been conclusively shown that this Company can conduct its business on equal lines to British provincial gas undertakings.

It is obvious that there must be a screw loose for a large undertaking, such as Dublin, to have to sell gas at 3s. 4d. per 1000 cubic feet in the city area, and then not be able to earn 4 per cent. on its 5 per cent. consolidated stock, which, under the sliding-scale, is entitled to £5 7s. 6d. per cent. with gas at 3s. 4d. Stockholders should not let this point be overlooked.

Not only has the ordinary capital of the Company been depreciated by nearly one-half its value, but the stockholders are losing £1 7s. 6d. per cent. I question if there are more than two or three companies operating in Great Britain who pursue such an outrageous policy as to penalize stockholders by not paying full statutory dividends, as regulated by the sliding-scale; and I certainly press that this should be seen to in the re-organization of the Company's affairs which I trust will now take place.

I stated in my letter appearing in your last issue that, in my opinion, this Company could, under proper conditions, sell gas to its ordinary consumers, within the city limits, at 2s. 6d. per 1000 cubic feet; and such price would permit of a statutory dividend of £6 7s. 6d. per cent. —raising the value of the consolidated stock to well over par. I adhere to this assurance. It is not a difficult matter to name many undertakings—some larger, and many smaller—situated equally disadvantageously to Dublin, selling gas at or about the figure I have mentioned. It is very easy to submit particular instances; but I question whether it is advisable, as I have no doubt that Dublin people have excuses pigeonholed for every possible point raised. Perhaps, however, for the guidance of the Stockholders' Committee, a comparison with a company whose geographical position (although not identical) is as near as one can select, having due regard to its size, &c., may be made.

Bristol charges for gas about 16d. per 1000 cubic feet less than Dublin, whose gross profit in 1912 per 1000 cubic feet of gas sold was only $3\frac{3}{4}$d. more than Bristol; in other words, there is 1s. per 1000 cubic feet difference to explain. Of course, it will at once be argued that the price of coal, &c., accounts for it. But let me annihilate that point. I have gone closely into the figures and the conditions. Bristol, I believe, does not get all its coal from the West of England area, but goes farther afield; and coke does not there bring as high prices as Dublin. This is borne out by the official figures for 1912, which show that Dublin realized nearly 17s. per ton of coke sold, as compared with Bristol's 12s. 8d. Why, then, should Dublin, with gas at 3s. 4d., not be able to make a profit commensurate with the gross revenue? Why does one shopkeeper prosper more than another while selling identical goods in the same street? The answer is one which we stockholders can easily guess. Of all gas undertakings in Great Britain, Dublin is a glaring instance of high charges for gas, low dividends to stock-

holders, and its securities marked-down to nearly one-half their value on the Stock Exchange.

What we stockholders want are Directors who can administer the affairs of the Company at the minimum of expense and at the maximum rate of profit. How this can be achieved is a matter for the stockholders now to prescribe, at this opportune moment; for I have been quite sure for some years that, unless a radical alteration took place, the Dublin Gas Company would drift into this chaotical state.

NONULUS.

Oct. 4, 1913.

The Gas-Cultured Shareholder.

SIR,—The article on the above subject in the last number of the "JOURNAL" should awaken considerable interest. I have always considered that the shareholder can render an immense service in circulating the advantages of using gas. This benighted individual is looked upon merely as the recipient of any dividend which the directors are pleased to pay him. For a lay shareholder to take an intelligent interest in the question of horizontal and vertical retorts or of the price of gas in the holder is, I much regret to say, the exception; but in his thousands he can exert enormous influence, even if he does not actually canvass.

The officers of a gas undertaking are responsible to its board of directors or management for the result of the year's working (frequently magnificent, under adverse conditions), and are paid for their services more or less—usually less; but the shareholder, who gets practically everything, is interested most and assists least. I am of opinion that he could, and would, assist if the possible pecuniary advantage were pointed out to him.

As a shareholder and as a reader of the "JOURNAL," I again beg to thank you for your article.

H. F. PARDY.

32, *Southwood Lawn Road, Highgate, N., Oct.* 2, 1913.

American Silica for Retorts and Settings.

SIR,—I have read with a great deal of interest the description of the manufacture and properties of American silica material in the issue of the "JOURNAL" for the 12th of August. I am herewith taking the liberty, however, of endeavouring to correct any misleading impression which might be created in the minds of the general consumers of refractory products by the article under consideration.

It appears that the statement made in respect to the purity of the fire-clay and the commercial impossibility of manufacturing a product of unvarying refractoriness from such clay is not strictly in accordance with the facts. The clay, in its natural state, is sometimes found of remarkable purity, and sometimes contains appreciable quantities of impurities. When these impurities become so excessive in percentage as to impair its refractoriness, it is no longer a clay useful for refractory purposes, or, in other words, it is no longer a fire-clay. Some of our average Jersey and Pennsylvania fire-clays show evidences of great purity.

The article under consideration then continues to state that it is a commercial impossibility to manufacture a uniform product, owing to the varying properties, or rather composition, of the raw material. It is in this connection the safeguards of a manufacturer are thrown about his process of manufacture so as to assure a product of uniform refractoriness. Constant analysis of his raw material will at once indicate any change in composition, and enable him properly to re-apportion, in advance, the ingredients entering into the mixture; thereby retaining the standard of refractoriness of his products.

The inconsistency of the article is shown in the statement that the raw material for silica products is naturally found of unvarying purity. Unfortunately this condition does not exist in practice; and it is equally as needful to maintain constant examination of the ganister as it is of the fire-clay. Experience shows that various pieces of ganister originating from the same quarry may have fusing-points considerably at variance with each other, though no visible evidences of these different fusing-points may be present. Here, again, nothing but a careful and continuous examination of the raw material will assure a uniform product to the consumer. Nature is not sufficiently dependable for the maintenance of a condition of such great importance.

Although much has been stated from time to time as regards the superior conductivity of silica material as compared with fire-clay, it is to be doubted whether any authority will unhesitatingly make the broad statement that the heat conductivity of silica is 50 per cent. greater than that of clay. Investigation shows that, under absolutely similar conditions, silica will conduct heat in from 15 to 20 per cent. less time than will any high-grade fire-clay. The question of relative porosity is dependent upon the character of the raw material entering into the composition of fire-clay material, as well as upon the fineness of grind and heat of calcination. It is quite evident that a brick burnt at a higher temperature, as in the case of silica brick, shows a somewhat lower percentage of absorption than a clay brick—the latter, unfortunately for the consumer, being seldom fired at the proper temperatures.

The writer is strongly inclined to believe that the retrogression of the clay brick which has undoubtedly occurred during the last ten years can, in a measure, be attributed to improper firing of the average fire-clay material. Under such conditions, the fire shrinkage is not eliminated in the kiln, where the elimination should occur, but in the completed structure when it obtains its operating temperature. It is almost impossible to lay sufficient stress upon this very important part of the process of manufacture, inasmuch as either an under-burnt silica brick or fire-clay brick is liable to cause very serious difficulty when subjected to the average operating temperature at present maintained in coal-carbonizing furnaces. An under-burnt clay brick will shrink considerably, and an under-burnt silica brick will expand considerably.

Unfortunately, the range of temperature between the points of incipient vitrification and viscosity of silica material is very much less than that of clay material. The danger of this fact undoubtedly becomes apparent immediately, for it means that when a silica setting is overheated no warning of the fact occurs until the setting is either ruined or badly damaged. On the other hand, clay material undergoes an intermediate change in physical structure. This change is known as the stage of complete vitrification, and is at once recognized by the fact that the structure loses its shape and begins to "sag." This alteration of form is due to a further softening of the grains sufficient to close-up all the pores of the material and render it impervious.

At the present time, when silica material is almost universally heralded as the saviour of the gas manfacturer, enabling him to derive the maximum yield from coal at minimum expense for bench fuel, the consumer is very liable, in his enthusiasm, to overlook the fact that even silica material has its limitation of temperature. The inevitable result will be a repetition of his former troubles mutiplied greatly; for it must be remembered that silica material gives no timely warning of the existence of a destructive temperature, such as exists in the instance of fire-clay material. This liability is greatly magnified by the published accounts of the extremely high temperatures which silica material will withstand without fusing. The article in the "JOURNAL" states that a certain brand of silica brick fuses at a temperature of 3550° Fahr.; this brick analyzing 96 per cent. silica with 3·7 per cent. of fluxing impurities. A broad statement of this kind, if unqualified, is very liable to result in trouble to the consumer, inasmuch as the claim is open to serious doubts, provided that the fusing-point of 3550° Fahr. was determined by the standard method of comparison with Seger cones. Experience shows that the average fusing-point of a considerable number of the various brands of silica brick on the market, with a 96 per cent. silica content, is never in excess of the temperature indicated by Seger cones Nos. 33 and 34—these cones indicating a temperature between 3254° and 3290° Fahr. It will undoubtedly be of interest to the average consumer to learn how the fusing-point of 3550° Fahr was determined.

GEORGE A. BOLZ, Manager,
Didier-March Company.

Perth Amboy (N.J.) Sept. 16, 1913.

Co-Partnership at Watford.

The annual meeting of the co-partnership members of the Watford Gas Company was held on the 26th ult.—Mr. E. J. Slinn (the Chairman of the Company) presiding. Dealing with the report and balance-sheet for the year ended the 30th of June last, the Chairman referred to the success of the fund since its inception four years ago, and pointed out that during this period the members had contributed more than £1600, while the Company had added £2000 in bonus and interest. During the past year alone the sum placed to the credit of the co-partners reached nearly £1000. He felt assured that the men as well as the Directors were very proud of this achievement; but there was just one item on the balance-sheet of which they could not afford to be so proud—viz., the large amount under the heading of "withdrawal." This in a great measure defeated the object the Directors had in view when starting the scheme; and in future the Committee would go more minutely into applications for payment than they had done in the past. The Chairman expressed the belief that, in these days of labour strikes and commercial unrest, co-partnership was one of the best ways of meeting the difficulty. He was glad to find so good a spirit prevailing among the men, and assured them that it was the ambition of the Directors to do all in their power to further the interests of each employee, upon whose individual effort so much of the prosperity of the Company depended. The report was adopted.

Lighting of Burnley's Back Streets.

The Gas Committee of the Burnley Corporation having decided that the back streets in the town should be lighted with gas, Mr. J. P. Leather, the Gas Engineer, prepared, according to instructions, a report as to the steps necessary to carry into effect the Committee's decision. In the course of it he stated that, where possible, he had endeavoured to improve the lighting by a rearrangement of the lamps in the adjacent main streets. In a few cases this had been done without adding to the number of lamps; but in a large proportion it was necessary to put lamps in the back streets. The addition of a considerable number of lamps raised the question of the system of lighting them; and Mr. Leather thought the present a suitable time for inaugurating a change. Controllers on the clockwork system are already in use in the district, and have worked very well for years, particularly those of the Horstmann-Gear type. Mr. Leather said he did not propose to adopt controllers generally, but he pointed out that, if a certain number of the lamps were fitted with them, it would be possible to combine the advantages of torch and controller lighting. The system could be gradually brought into use. The controllers cost 30s. each; but they would last a good many years. The saving in the cost of lighting and extinguishing amounted, on an average, to 7s. per lamp per annum. By adopting controllers for the lamps which with torch lighting entailed most walking, the saving would be somewhat greater; and, in addition, there would be a smaller quantity of gas consumed, and economy would be effected in the use of mantles. The Committee approved of the report; and a commencement has been made with back streets in three out of twelve wards of the town.

For the proposed water supply for Westbourne and Southbourne (Sussex), the Rural District Council have commenced boring operations at Woodmancote; but up to the present, at a depth of 217 feet, the yield has been only 2000 gallons an hour. It is estimated that the supply will require 4000 gallons an hour; and the boring is, therefore, to be continued.

The employees of the Portsea Island Gas Company have formed themselves into a class for obtaining technical knowledge in regard to the methods of manufacturing gas and using it most economically, both as an illuminant and a heat producer. In the course of a short speech last Tuesday, the Principal of the Portsmouth Technical College stated that the class was being thoroughly well supported.

MISCELLANEOUS NEWS.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

Reduced Dividend and Increased Price of Gas—Independent Investigation Granted.

The Half-Yearly General Meeting of the Alliance and Dublin Consumers' Gas Company was held in the offices, D'Olier Street, Dublin, last Tuesday—Alderman W. F. COTTON, M.P., D.L. (the Chairman) presiding. Attendance by shareholders was unusually large.

The SECRETARY AND MANAGER (Mr. Frances T. Cotton) having read the notice convening the meeting, the report of the Directors, with the accounts for the six months ended the 30th of June, some particulars from which were given in the "JOURNAL" last week (p. 942), were presented.

The CHAIRMAN, in moving the adoption of the report and accounts, said that during the period under review the Directors had had a very anxious time. The prices of coals and oil had increased materially—to such an extent, indeed, that the Directors were compelled to recommend a reduction in the dividend and an increase in the price of gas. When the Company promoted a Bill in Parliament in 1909, they were obliged, owing to the opposition by the local authorities, practically to abandon their differential rates, and, in addition to this, to make a reduction of 3d. per 1000 cubic feet in the price of gas. This meant £28,000 per annum reduction in the Company's receipts. They also undertook not to raise the price of gas for the three following years. They were advised at the time that the economies which would be effected by the new burner and the introduction of new plant would meet this loss; but they did not anticipate the enormous increase in the price of all materials and also in wages. The London companies and nearly every other gas company in the kingdom had had enormous increases in gas-rental, whereas they in Dublin had had a decrease of more than 24 million cubic feet. He had no doubt that, through the ordinary channels of communication, the proprietors had been made conversant with the great increases in the prices of coal and oil, and, he might say, every other commodity used in the process of carbonization. These enormous increases applied to all materials used in the manufacture of gas, and had caused the Directors, in conjunction with those of other gas undertakings, most serious consideration. They very much regretted the loss sustained by the proprietors and the public, which necessitated a reduction of the dividends that they had for some time past been in the habit of receiving, and an increase in the price of gas to the extent of 2d. per 1000 cubic feet. They hoped, however, that the greater part, if not the whole, of the lost ground, would be recovered in the future. While very much regretting that any check to the former progressive state of the Company should have taken place, they viewed it as a temporary reaction incidental to all large commercial undertakings, and not as indicating any permanent set-back in the long-established prosperity of the Company. Contracts for coals extending over twelve months had been made at prices higher than those of last year; and they waited as long as could be reasonably expected to see if prices would moderate. It was impossible to give a forecast with any degree of confidence, but he should be greatly surprised if the price of coals and oil did not show a reduction by the time the present contracts expired. The record of the manufacture and distribution of gas for the past half year, ending at midsummer, was submitted; and also a statement of profit and loss for a like period; and from these it would be seen that a sum of £26,895 15s. 2d. only remained available for dividends. The Directors recommended payment of dividend at the rate of 4 per cent. per annum on the consolidated ordinary stock, absorbing £29,226 16s. 11d.; therefore it would be necessary to draw upon the reserve fund to the extent of £2331. The capital charges for the current half year were small, having regard to the large district the Company supplied. During the period covered by the report, there had been added to the cooking and heating apparatus in use 1728 installations, each fitted with cooker, brackets, and pendant. There were also 109 cookers supplied to houses which had not before had service-pipes to cookers, while 874 cookers and 309 heating stoves were let on hire; in addition to which, 74 stoves and 10 fires were purchased by consumers—making in all 53,202 cooking and heating appliances in use. He might mention that in South Melbourne, which was a comparatively new lighting district, there were 60,000 people using gas-cookers; and there were also a number of people who use gas-fires. The fact that there were no bad fumes from these fires was becoming recognized. There had been a large demand for them during last year, when they were first introduced. There were 348 gas-fires and heaters installed in Melbourne.

THE MANAGEMENT CRITICIZED.

No doubt a circular-letter, under date of Sept. 27, from Mr. F. J. Dickens, of Worsley, near Manchester, one of their English shareholders, criticizing the management of the Company, had reached some of the shareholders present. As stated by the writer, he had been in correspondence with the Board at intervals for some time past on the subject of the fall which had taken place in the value of the shares of the Company—in common with all other securities, especially Irish ones. The Board welcomed his inquiries, as they always did welcome fair criticism when coming from any of the shareholders—especially from their friends over the water—and afforded him all the information in their power. They furthermore invited him to come to Dublin to visit the works and district, and obtain on the spot any further information he might desire; and they added that, if any demand for further investigation (aided by an independent expert) came from any substantial section of the shareholders, the Directors would afford facilities for it, provided the expert were acceptable to the Directors. Mr. Dickens, in response, made a hurried visit to Dublin, and met the Directors in the Board-room on Tuesday, the 23rd of September, as stated in his letter. On that occasion, the Chairman and other Directors, with the officials of the Company, and Mr. H. E. Jones, for many years the Consulting Engineer of the Company, under whose supervision the great extensions and improvements recently made in the works had been executed, were present. He (the Chairman) might state that Mr. Jones, in addition to being the Consulting Engineer of many companies, was himself the Director of several important gas undertakings and the Chairman of more than one. Mr. Dickens declined to avail himself of the opportunity to inspect the works, stating that he was merely "a plain man of business" and not a gas engineer, and, besides, pleading that he was under pressure to leave Dublin by the midday boat. He then submitted a number of points arising, he said, on his personal study of the accounts of the Company, and of those of other gas undertakings in the United Kingdom, and contrasted the results obtained in Dublin with those, on an average, in all the undertakings of the United Kingdom, and in particular with the gas undertaking of Belfast. The figures indicating these results, as ascertained by him, he had now appended to his circular.

A COMPARISON OF BELFAST AND DUBLIN.

The Directors could not accept the accuracy of Mr. Dickens's figures or conclusions. The comparison of the results of the working of the Company with the average of the results obtained in all gas companies was hopelessly misleading, as the majority of the undertakings existed under totally different conditions from those prevailing in Dublin, and which were peculiarly exceptional and adverse. With respect to the Belfast undertaking, of which Mr. Dickens appeared to have made a special study, it was not a parallel case with that of the Dublin Company. The area served by it was much less, the population denser, and the number of large installations far in excess of those existing in Dublin. Besides, it was a municipal undertaking, having many advantages which no private company possessed. Mr. Dickens had with him the Belfast accounts, of which neither the Directors nor Mr. Jones had made any special study, not being in "Field's Analysis." In the hasty and cursory consideration of them at the interview with Mr. Dickens, Mr. Jones and the officials of the Company were able to indicate several points in which Mr. Dickens appeared to have arrived at erroneous conclusions. As there was no time to thrash the matter out, they invited Mr. Dickens to place his notes and figures at the disposal of Mr. Jones and the officials, so that they might consider the questions raised by him, and give a full and detailed answer.

AN INDEPENDENT INVESTIGATION.

He (the Chairman) did not propose to go into the matter further in detail, as the Directors had decided, in accordance with the offer they made at an early stage of the correspondence, to permit an independent investigation of the accounts and working of the Company, if any substantial body of shareholders desired it. As Mr. Dickens appeared to represent a considerable body of them, and as Mr. Wilkinson—who was to have been present that day with the intention, he had frankly and courteously informed the Directors, of adversely criticizing the management, and who was afforded an opportuuity of going through the works of the Company—was also seeking investigation, the Directors thought it was in the interest of the Company to accede to this request; and, accordingly, they would give Mr. Dickens and Mr. Wilkinson, and any body of shareholders with whom they might be associated, facilities for pressing their inquiries, and, if necessary, calling in, on their behalf, an independent expert to aid them. The expert, however, to be appointed on behalf of the shareholders must, as intimated in the Secretary's letter to Mr. Dickens of the 30th of August, be a gentleman acceptable to the Board; and his selection, therefore, must form the subject of further negotiation and arrangement. He (the Chairman) did not feel called upon to express at present any opinion on the fitness of a gentleman suddenly named by Mr. Dickens, while quite admitting his high standing as a gas engineer. There were, however, other considerations which could not be lost sight of; and the appointment of an expert must, as he had already said, form the subject of further negotiations between the Directors and Mr. Dickens. He wished to add that he believed the conclusions adverse to the Company at which Mr. Dickens, as a layman, had arrived, would not, when thorough investigation was gone into with proper expert assistance, prove to be correct; and he asked the shareholders to suspend their judgment on the figures submitted by Mr. Dickens until the results of the proposed investigation were known.

Mr. SCALLAN seconded the motion.

STOCKHOLDERS' REMARKS.

Mr. W. H. DAVIES expressed disappointment at not hearing from the Chairman some explicit reason for the extraordinary falling-off in the value of the Company's stock. There was, he said, a very strong feeling among the Lancashire stockholders, who were a numerous body (of which he was one), that something was wrong. He was not in a position to indicate what it was, but undoubtedly a feeling of the kind prevailed. It might possibly be the cost of material, the expense of manufacture—though he was bound to admit that the latter bore favourable comparison, so far as he could judge, with that of other companies—competition, the supply of cookers free of charge without stipulation as to the minimum quantity of gas to be consumed, or the cost of distribution, management, and bad debts. There was a considerable holding of the Company's stock in Manchester; and the holders had been expecting, on account of statements made at previous meetings, a more favourable report, owing to the improvements made in the system of carbonization, high-pressure gas (which was said to be giving admirable results), and the new retort-house; whereas they found the result to be a very considerable depreciation in the value of the stock. They had no wish to force upon the Directors anyone to make an examination of the present state of the Company's affairs, but they honestly felt in Lancashire that Mr. Newbigging, by virtue of his large experience, should not be lost sight of; and they strongly urged that he might be allowed to make an investigation and report. They wanted to do the best they could for the Company; and they ought not to be limited to one expert. They should have two or three; and perhaps one would find out what another had missed. One thing that struck him in regard to the accounts was that the quantity of gas sold showed a small increase as compared with the increase in the units of electricity sold by the Corporation. It seemed out of proportion to the larger capital. What the shareholders were concerned with was the extraordinary drop in the value of the shares; and they thought the time had come

when something should be done to try to put their finger on the weak spot, and bring the Company round to what it was some four or five years ago.

Mr. LYNE regretted that the Directors could not be congratulated on the report they had submitted. They proposed to reduce the usual dividend by one-fifth, or 20 per cent., and put on the consumers an additional tax of 2d. per 1000 cubic feet of gas. In his opinion, the price of gas was too high; and it would have been sounder policy to reduce it. In Dublin, it was 1s. 6½d. per 1000 cubic feet more than in Belfast; and this amount on the quantity of gas sold in the latter city would come to a very considerable sum. He calculated it at £164,387, which would pay a dividend of 4 per cent. on a capital of £4,000,000, which was more than the Company's capital. The proposed increase in Dublin would show a difference in favour of Belfast of 1s. 8d.—in reality of 1s. 9d. There was no reason that he could see why Dublin should not be able to get its materials as cheaply as Belfast; and he instanced a case of a smaller town, of which he had knowledge, where the materials were cheaper. He understood they were to have a general inquiry; and he hoped it would result in good. There was no reason why the Company should not have a prosperous future. He believed it would have it if things were worked as they should be. There was certainly room for vast improvement; and he was sure he spoke the mind of the shareholders as a whole when he expressed a hope that the improvement would soon set in.

Mr. HARRISON (from Lancashire) asked what was the illuminating power of the gas; and he was informed that, while it was formerly 16 candles, it was now 14. He went on to criticize the policy of increasing the price, which he said was more than a doubtful policy. He thought that there should be an independent inquiry, and that the person selected to make it should be one having the full confidence of the shareholders. The gas consumption was tending to decline, even at the existing price. Why, then, should they now increase the price? The shareholders, so far as he knew, greatly feared that matters were approaching a crisis; and there would be even more dissatisfaction than already existed unless there was improvement, and things were put on a more satisfactory basis all round. He hoped the Directors would fall in with Mr. Davies' suggestion to have an independent investigation. The feeling among the English shareholders was in this direction; and the Board would undoubtedly be wise in taking it into consideration.

Mr. SAYERS endorsed what had been said by the previous speakers. There was, he remarked, a strong feeling that something was wrong, and that steps must be taken to put matters right. He supported the proposal for the appointment of an independent expert.

Mr. PURCELL assured the Directors that the feeling of discontent was not confined to Lancashire, but existed among the Irish shareholders, of whom he was one. He trusted the Board would yield to the request of the Lancashire shareholders, and let their expert—the expert chosen by the shareholders, who had every right to see that the affairs of the Company were properly managed—inquire into, and report upon, the condition of matters in regard to the control and management of the undertaking. He could not help noticing the decrease in the quantity of gas sold; and he supposed it was due to the competition——

Mr. LYNE: And high price.

Mr. PURCELL: Yes; and municipal enterprise in Dublin. The general experience, he continued, was that where there was municipal enterprise and private enterprise in conflict, the latter did not go to the wall. Some years ago, the Directors introduced new plant, which was to do great things; but, as a layman, he thought that the gas supplied under the new conditions was more a heating than a lighting gas, though probably it gave better results. The policy of the Company in introducing the new form of lighting should have been educative—they should have shown how to use the new gas. He was of opinion that their policy had not been along this line—that the new gas was consumed in the old burners, and that thus the light came to be depreciated, and people did not think so much of it. The speaker concluded by calling attention to items in the accounts showing that while two-and-a-half years ago works wages stood at £3200, the amount now was £4100—an increase of 30 per cent. This, he said, called for explanation.

THE CHAIRMAN'S REPLY.

The CHAIRMAN, in reply, said the Directors never made the slightest objection to the employment of an expert; and they had not negatived the suggestion that Mr. Newbigging should be chosen. In regard to the sales of gas, it should be remembered that the Dublin Corporation had great influence with three large institutions—the two city workhouses and the Richmond Lunatic Asylum. What had they taken from the Gas Company during the past twelve months? There was the asylum, which consumed 4,110,100 cubic feet of gas, the North Dublin Union (though in this case the electricity installation was not completed), which consumed 2,040,200 cubic feet; and the South Dublin Union, which had a consumption of 3,897,100 cubic feet. The quantity of gas lost to the Company during the last twelve months was 24 million cubic feet; and the profits on this would have been very considerable.

SOME PERTINENT QUESTIONS.

Mr. LYNE: Remember that you increased the price. The lower the price, the more you sell.

The CHAIRMAN: That is the old theory.

Mr. LYNE: I have had practical experience of it.

The CHAIRMAN: I will not argue the point with you.

Mr. LYNE: With all respect, you could not, Sir.

The CHAIRMAN went on to say that the Board were quite willing to have experts consulted—one or two, or even three.

Mr. HARRISON: Are the Board willing to have Mr. Newbigging as one of them?

Mr. DAVIES said his firm represented £25,000 in the Company; and this was a matter not to be ignored. They need not adopt Mr. Newbigging's report; but they should hear what he might have to say.

The CHAIRMAN said he knew that numerous English shareholders would object to Mr. Newbigging; but, of course, the Board would consider his name. The matter had not been dealt with by the Board at all; but they would give it their attention.

Mr. HARRISON: Will you give an undertaking that one of the gentlemen appointed will be acceptable to the shareholders?

Mr. SCALLAN: I think we may say we will try to find a perfectly independent man and have a full and free investigation.

The report and accounts were then adopted.

THE DIVIDEND DECLARED.

ON the motion of the CHAIRMAN, seconded by Mr. FOTTRELL, a dividend at the rate of 4 per cent. per annum was declared.

THANKS TO THE DIRECTORS AND OFFICERS.

On the motion of Mr. G. W. NORMAN, seconded by Mr. M'BRIDE, thanks were accorded to the Directors and the officers of the Company for their services.

Alderman COTTON acknowledged the compliment, and assured the meeting that it was the desire of the Board and of the staff to do their best in the interests of the shareholders. The resolution was very acceptable.

A SHAREHOLDER: In the circumstances.

Alderman COTTON: Well, if you like, "in the circumstances." [Laughter.]

This terminated the business of the meeting.

Mr. F. J. Dickens writes to point out an error in his circular on the affairs of the Company, which was reproduced in the "JOURNAL" last week. In the last line of the figures in the table, comparing Dublin with Belfast, the words "less residuals" should have been omitted. He explains that he first prepared a set of figures with the residuals deducted, but subsequently decided to make the comparison without such deduction. Unfortunately, in preparing the circular for printing, he omitted to strike out the words referred to.

Newspaper Comments on the Company's Position.

Commenting on the report of the proceedings at the Company's meeting, the "Irish Times" said: "It makes unpleasant reading for a very large section of the Dublin public. The supply of gas is a monopoly, and, in view of the excessive prices which have hitherto ruled, this further increase requires a vast amount of justification. The justification which the Directors produced at the meeting is, in our opinion, quite inadequate. We have nothing to do with the Directors' duty to their shareholders. Their defence is that there have been enormous increases in the price of coal, of oil, and of every commodity used in the process of carbonization. There has also been some increase in wages. Competition with other sources of lighting has been keen. Finally, while nearly every other company in the kingdom has had great increases in gas-rental, the Dublin Company has sustained a loss of more than 24 million cubic feet. This last fact appears to us to give away the whole of the Company's case, from the public point of view. The policy of raising prices to attract customers does not appeal to us as a business proposition; every economic principle leads precisely in the opposite direction. But this aspect of the matter is, of course, the Company's own affair. The public will undoubtedly resent being asked to pay more for its gas in order to cover the Company's losses. The other causes advanced in support of the rise in price will not bear examination." It is pointed out that while Dublin is paying 3s. 4d. per 1000 cubic feet for gas, and is going to pay 3s. 6d., Belfast is paying nominally 2s. 3d., but actually, provided the accounts are paid within one month, 20 per cent. less. The parallel, the writer declares, may not be close, and the Dublin conditions may be exceptional; but, making all reasonable allowance, there is no proof that the price of gas in Dublin ought to be anything like so much as nearly twice that in Belfast. "The Belfast undertaking," it is remarked, "is, of course, a municipal concern. We fear that no such way of relief can be advocated in Dublin. To hand over the gas lighting of the city to the Dublin Corporation, while it possesses its present reputation for municipal incompetency, would be too hazardous an adventure. At the same time, no other course of escape from the excessive price of gas in Dublin suggests itself. In these circumstances, there seems nothing to do except suffer the costly monopoly of the Company until the Corporation is fit to discharge its business."

The Dublin "Daily Express" advances the opinion that no fault can honestly be found with the Gas Company on the score of management, considering the great and steady rise in prices and wages. "It is hardly fair," the "Express" considers, "to indulge in adverse criticisms at this period. When one bears in mind," it is remarked, "the peculiar circumstances and the grave difficulties by which the Company is hampered, we are confident that its management will bear comparison with any similar undertaking in the United Kingdom; and we are quite sure that the Board need not have the slightest fear of the result of the independent investigation into the accounts and working of the Company which the Chairman promised."

The writer of "City Notes" in the "Pall Mall Gazette," commenting on the fall in the price of Dublin gas stock, said: "It is not at all surprising to find that businesslike shareholders are up in arms. They are demanding thorough investigation and overhauling of the methods of the Company. There must be a screw loose somewhere. The Company has a good field, and has done well in the past. Properly managed, it is difficult to see why it should not do well in the future. Apparently the Directors are quite willing to meet critics half way; and an independent gas expert of standing is likely to look into the affairs of the Company. It is certainly time something was done."

Ratepayers and their Gas-Works.—Alluding, in the West Bromwich Town Council, to a projected visit to the gas-works by the local Tradesmen's Association, Alderman Blades said it was very pleasing to the Committee, as well as to the staff, to feel that the public were taking such an interest in the gas-works, and they would even like to see this interest increased. There were thousands of West Bromwich people who had never seen their gas-works, except from outside. He felt sure the more the public understood the work that was going on in connection with the gas undertaking, the more they would apppreciate it. The Engineer (Mr. Harold E. Copp) had said many times that he would like to see the public taking more interest in the gas-works.

THE STOCKPORT GAS-WORKERS' STRIKE.

The strike of employees at the Stockport Corporation Gas-Works, which began last Saturday week, was soon productive of disastrous results to local trade, as well as great inconvenience to the inhabitants generally. As was stated in the last issue of the "JOURNAL," the men demanded improved conditions and an alteration regarding non-union labour. The reply made was that the Corporation could not interfere in the non-union question, but were prepared to consider the other matter. On the night preceding the strike, a deputation of the men waited on the Gas Committee, who offered to consider the grievances of each section of the workers separately. This offer, however, the deputation declined, and subsequently 300 men ceased work.

On Saturday and Sunday, the effect on the gas supply was evident; and on the Monday many industries were brought to a standstill, though a certain amount of gas was still being made. The men, who are members of the Municipal Employees' Association, held a meeting in August, and resolved to go on strike if the Committee would do no more than refuse (as they had done the month before) certain requests —which followed on concessions granted last year. The Corporation thereupon appointed an Emergency Committee; and there was an interview between the parties, which resulted in the appointment of the deputation already referred to. One of the demands of the men is for an increase of 12½ per cent. on all the wages now paid, with one or two specific exceptions. This would, of course, raise the existing minimum wage of 25s. for 53 hours' work in a week to over 28s. Enginemen must be paid 35s. and boilermen 30s.; and both must have a six days' working week. Jointers for main-laying work must have 7d. an hour, and hydraulic men must be paid overtime beyond nine hours' work on any day. The conditions of the stokers in the retort-house must be improved; and no preference is to be given to non-union men —of whom there are seven on the permanent staff, besides a few who are taken on casually through the Labour Bureau.

An effort to bring about a settlement was made on the Monday night by Mr. A. Bellamy (the Chairman of the Stockport Trades Council), who interviewed Mr. James Fernley (the Chairman of the Gas Committee). Mr. Fernley promised that he would submit to the Committee later in the evening the following proposals: The men to return to work in the morning and formulate their complaints in writing; the Committee to take a few days to investigate, and then to meet the representatives of the men to enable them to state their case—each section to have its own spokesman. The Committee afterwards agreed; and Mr. Bellamy communicated the proposal to the men's Strike Committee. The Strike Committee, however, definitely rejected the proposals, and declared that the men would not return to work until the Gas Committee received them. Mr. Bellamy made another attempt to persuade the Strike Committee to give way, but they remained firm. Mr. J. T. Jones (the District Secretary of the Municipal Employees' Association), who advised them to return to work, said he was up against a brick wall, and the position seemed hopeless.

The Gas Committee discussed the situation at length on Wednesday, and at the close of their deliberations there was issued the following statement:

> In February, 1912, advances of wages were granted throughout the Gas Department, which in the aggregate amounted to £3500 annually. The leaders of the men at that time stated that the treatment the men had received was generous. For a few months everything went well at the works, but since then there have been innumerable cases of insubordination—such as smoking in the works, wilful destruction of tools, leaving the works for drink at times other than those allowed, under-charging of retorts, and also general neglect of duty. The plant at the works is in a disgraceful state, notwithstanding the fact that the men have been repeatedly asked to keep it up to its usual standard.
>
> The Committee have tolerated these conditions up to the present; but now that the men have chosen to come out, the Committee feel bound to take the same into serious consideration. Regarding the question of wages, and the request made for an increase of 12½ per cent. to all unskilled and semi-skilled workmen, this request was made to the Special Committee appointed by the Town Council on Aug. 16; and the Committee decided that, having regard to the fact that the whole matters of wages were settled between the Town Council and the Municipal Employees' Association so recently, they could not recommend the Council to make any further concession.
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> On the question of non-unionists, the General Secretary of the Municipal Employees' Association told the Special Committee of the Town Council that 95 per cent. of the towns in England and Wales had agreed to allow his Association to issue a notice and post it in the various departments of the Corporation, stating that after a certain date the members of their organization would seriously consider the advisability of working with persons who were non-members; and he mentioned ten towns. On being communicated with, these towns stated that they had not authorized the fixing of any such notice, and that no such notice had been fixed; and, further, in a number of cases the corporations stated no application to fix such notices had been made.
>
> With regard to the interview which should have been held on Sept. 26, the Committee wish it to be clearly understood that they did not seek to interview the men singly, but in sections, along with their officials; and there would have been at least three persons in the room at each interview.
>
> For the information of the public, the Committee would like to say that the average wages of a stoker are £2 3s. 5d. per week, labourers 25s., lamplighters 25s., with overcoat and cap. In addition, the men have certain holidays with pay. These wages are more than the average paid throughout the country.
>
> These are a few of the difficulties the Committee have had to contend with during the past year or so; and the time has now arrived when they have to decide whether this insubordination, which is causing considerable loss to the department, should be allowed to go on, or whether the Gas Committee should resume proper control of its works through its Manager and officials, and so obtain the best results for the large sum of money belonging to the ratepayers which is invested there.

Later in the evening the announcement was made that on the following morning the Committee would receive a general deputation representing the men out on strike. The meeting duly took place at the Town Hall; the deputation consisting of thirteen representatives of the different sections at the works and Mr. J. T. Tenenan (the General Secretary of the Municipal Employees' Association). The conference lasted over five hours, and it was admitted that the deputation had been given a patient hearing. The Committee's decision was communicated to Mr. Tenenan by the Town Clerk in the following letter.

> Referring to the interview between the Gas Committee and the representatives of the Municipal Employees' Association and gas workers to-day, I am directed to inform you that the Committee have adopted the following resolution—"That this Committee cannot accede to the request of the workmen for advances in wages, having regard to the generous increases granted recently." I have also to state that the Committee will meet on Monday next, the 6th inst., at 5.30 p.m. to consider the statements made by the men to-day, and any other complaints which I may receive from you in writing before that date.

This communication was followed by a mass meeting of members of the Municipal Employees' Association, at which Mr. Jones said it was evident that the Committee had got their backs up, and the men, as the result of the attitude of the Committee, had got their backs up also. The men would refuse to go back to work until substantial concessions were made, and the whole of the "blacklegs" who had been imported into the gas-works were turned away. The men's patience was almost exhausted, and it would be a difficult matter for them to continue to conduct the dispute in a peaceful manner. Mr. Tenenan stated that he had asked the members of his Executive to sanction the withdrawal of the whole of the trade union employees in every department of the Corporation in the event of "blackleg" labour being introduced; and he had received a reply from half of them consenting to give him full power to bring out the Association members if necessary, and give strike pay. The men were not going to fight with their hands tied behind their backs. The Committee's reply meant that the men were expected to return to work under the conditions which existed before they came out on strike, and without a promise that they would receive any consideration. He suggested that he should be instructed to inform the Town Clerk that, unless there was a settlement in the meanwhile, the whole of the Association members in the various departments of the Corporation would be withdrawn on Monday evening. The employees in the other departments had certain questions to settle with their respective Committees; and if they were brought out, they would require a full settlement before they went back to work. Before the last strike the gas workers were getting 10 or 12 per cent. less than the wages paid for similar employment in other towns, and many of them were now paid 2s. less than the average paid in other towns. It was reported during the meeting that 97 per cent. of the employees in the gas, highways, sewage, and cleansing departments were members of the Association, and that they were well organized. After discussion, a resolution was adopted stating that all the members of the Association would cease work at noon on Saturday, failing a settlement in the meanwhile.

Some improvement in the quantity of gas supplied was noticed on Thursday night—some men having been taken into the works in motor-cars, which successfully eluded the pickets. Fifteen men, it was rumoured, had arrived in this way—making a total of about thirty engaged in the works, where they are being housed and fed.

At noon on Saturday, 300 employees in various departments of the Corporation came out on strike to support the gas workers. Those who should have started at that hour for the afternoon shifts, declined to go to their places. The deadlock is now complete, 700 Corporation men—practically the whole of the local members of the Municipal Employees' Association—being on strike. This is the eighth day since the stoppage at the gas-works. Almost every day has brought with it fresh developments, and the simple issues that led to the strike of gas workers without the authority of their Union have been complicated at every turn. The men are, apparently, unanimous, being demonstrative and orderly. The Gas Committee were to meet on Monday night to further consider the position. Most of the houses and the shops are lighted by oil or candles. On Friday, a shop lighted by an oil-lamp was partly destroyed, owing to the lamp overturning. So far this is the only fire of the kind which has been reported since the more primitive methods of lighting have been resorted to. There was, however, a confident feeling at the gas-works that by Monday the supply in the holders would be sufficient to enable the authorities to give a normal pressure, and so place some of the manufacturers in a position to resume work. Each of the strikers received 10s. strike pay on Saturday, with an extra 1s. for each child under 14 years of age. Altogether £250 was distributed. The application of the gassers and doublers, who have been thrown out of work as the result of the strike at the gas-works, for lock-out pay, has been refused. The local branch of the Gas-Workers and General Labourers' Union, of which these men are members, held a meeting on Friday, at which the situation was discussed; and they applied to headquarters for a grant of out-of-work pay. This has been refused by the Executive, who state that, as the Union have taken no part in the strike, and were not in any way responsible for it, they could not grant the application.

In connection with the description of the new premises of the York Gas Company recently given in the "Yorkshire Herald," and noticed elsewhere, was a photographic group showing the Company's lighting staff equipped for proceeding on their nightly duties. The staff consists of thirteen members, but only twelve are shown; and their length of service ranges from 50 to 3½ years—an aggregate of 311½ years, or an average of practically 24 years each.

WELSBACH LIGHT COMPANY, LIMITED.

About twenty minutes sufficed for the transaction of the business at the annual general meeting of the Welsbach Light Company, which took place last Tuesday, at Winchester House, E.C. In the absence of the Chairman (Mr. R. Feuer), the proceedings were presided over by the Vice-Chairman (Mr. J. R. Yates).

In the course of his remarks when moving the adoption of the report and accounts, Mr. Yates pointed out that the profit and loss account for the year ended March 31 showed a profit on trading of £5694, which compared with a loss the previous year of £4345. This was a difference of £10,000; and though perhaps it was not a great stride, still it was a step in the right direction. The dividend on the shares in the Austrian Company, £14,690, was similar to that embodied in last year's accounts—namely, at the rate of 12 per cent. Since the close of the financial year, however, they had received the Austrian Company's accounts for the twelve months to March, 1913, in respect of which a dividend of 6 per cent. only was distributed, owing to the adverse conditions which had prevailed. The unsettled state of affairs in Eastern Europe was a matter of common knowledge. The effect on trade in Austria-Hungary had been bad, and the Company's interests had consequently suffered, though, of course, this did not affect the present accounts of the Welsbach Company. On the other side of the profit and loss account there was an item which was nowadays only too familiar—that was, depreciation on investments. Last year they wrote off some £1100; and on the present occasion they had to write off nearly double as much (£2040). The balance of profit carried to the balance-sheet was £1787, which, deducted from last year's debit balance of £4952, left a net adverse balance of £3165. With regard to shareholdings in other concerns, the Company had acquired an interest in B. Cars, Limited; and the Directors believed that the acquisition would prove satisfactory. Then, since the end of the year they had also acquired the stock of the General Incandescent Company, and had paid for it. Shortly after the last annual meeting, Mr. Fletcher, who had for many years been connected with the Company and its predecessor, resigned his position as Managing Director, and it became the duty of the Board to secure a successor. This was not an easy quest to embark upon; but after overcoming many difficulties, an arrangement was ultimately effected by which Mr. Cars (who had had long and successful experience in lighting and work of the kind) became Managing Director. They had also lost their old Chairman, Mr. Kallmann, who had retired from the Board coincidently with his resignation from the Board of the Berlin Company. Mr. R. Feuer had become Chairman, and Mr. S. Sello had been nominated to a seat on the Board. The old methods of gas lighting received a severe shock when lighting by electricity began to be perfected; but, after the first recoil, the invention of the incandescent mantle, and the extension of the use of gas for heating, &c., again enabled gas to challenge its rival. This led to improvements in electricity; and, lastly, there was the reply of gas enterprise in the form of high-pressure lighting and heating, which had given the industry so great a stimulus. The important high-pressure branch had been taken up by the Welsbach Company, who were already supplying appliances to some of the largest towns in the country, and were making large preparations to meet the coming demand. In the strenuous competition which existed, every effort was being made to keep the Welsbach Company well to the front. He reminded the shareholders of the National Gas Exhibition, and remarked that in connection with it the Welsbach Company were doing their share. In conclusion, Mr. Yates said the Directors had brought the Company through what had been an arduous and difficult year. Every effort had been made to open up fresh ground; and the trend of business, he was pleased to tell them, had been, and continued to be, in an upward direction.

Only one question was put, and this was by a shareholder who asked whether the report of the Austrian Company could be published for the information of the shareholders. To this the Chairman replied that the Austrian Company were not in the habit—nor were any other Austrian companies, as he understood—of issuing a report to the shareholders in the same sense as was done in this country. There was an annual meeting, at which a report was submitted; but reports were not circulated among the public. The matter had been carefully considered, and it had been thought desirable that the report of the Austrian Company should not be circulated among the shareholders, which would make it entirely public property. The Welsbach shareholders were represented on the Board of the Austrian Company by several members of their own Board, who were perfectly capable of seeing that their interests should not suffer in any way.

The report was then adopted, and the retiring Director (Mr. Sello) and the Auditors (Messrs. Deloitte, Plender, Griffiths and Co.) were re-appointed.

Lighting of Kegworth.—The gas-lamps at Kegworth have remained unlighted since last January, in consequence of the refusal of the parish to pay an additional 2s. 6d. per lamp which was demanded by the Gas Company. The matter has, however, now been settled by the Company agreeing to supply the gas at the old price. The Lighting and Watching Act has therefore been re-adopted.

Gas Wanted at Lyndhurst.—At a recent meeting of the Lyndhurst Parish Council, Mr. Courtney, according to notice, proposed that the Clerk be requested to write to the Directors of the Southampton Gas Company, asking them to extend their mains to Lyndhurst, in order that the people who require it might use the gas either for lighting or cooking, or both. He had made inquiries in the village, and was convinced that 90 per cent. of the inhabitants would take the gas at any rate for cooking purposes. From his own experience, this was much the best way of cooking; and it had the advantage of being clean. The Rev. T. W. Scamell suggested that it should be pointed out to the Company that it would be to their advantage to go to Lyndhurst now. He did not think they quite realized the altered state of opinion locally on the use of gas for cooking and lighting, nor how much the parish had increased during the past few years. The proposition was carried unanimously.

EDINBURGH AND LEITH GAS COMMISSIONERS.

Gas Exhibition Contribution—The Price of Gas.

A Meeting of the Edinburgh and Leith Corporations Gas Commissions was held in Edinburgh on Monday of last week—Lord Provost INCHES presiding.

THE NATIONAL GAS EXHIBITION CONTRIBUTION.

Intimation was made that, at the request of the National Gas Congress and Exhibition, 1913, the Commissioners had reconsidered the contribution authorized by the Finance and Law Committee, and instructed that their contribution should be 50 guineas.

Mr. PENNELL dissented from this finding, maintaining that the Commission were a statutory body, and that it was no part of their duty to contribute money.

After some discussion, it was intimated by the Chairman that the objection would be entered.

PRICE OF GAS.

Attention was next directed to the estimates of revenue and expenditure for the year, and to the price to be charged for gas. In this connection, the Works Committee reported that, after considering the report and estimate, they had resolved to advise the Commissioners to continue the present rates for gas as stated in the estimate, such charges to remain in force for one year after the rendering of the next accounts, subject to the discounts authorized from time to time. The report, signed by Mr. A. Canning Williams, the Treasurer and Collector, is as follows:

It has been assumed that there will be an increase in the sale of gas of 2½ per cent. [The increase in 1912-13 was 4·11 per cent.] The figures reveal an estimated deficit of £24,438 11s. 3d., as compared with a surplus in 1912-13 of £8129 5s. 4d., or a total diminution of profit of £32,567 16s. 7d.

The following statement shows how this result is reached:—

Increases in Estimated Expenditure—			
Coal (2s. 4·32d. per ton)			£27,140 5 1
Wages (carbonizing)			861 11 10
Repairs of works and plant			1,160 9 0
Rates and taxes			1,105 16 10
Other revenue account items			1,435 0 10
Annuities, interest, sinking and reserve funds, &c.			255 8 3
			£31,958 11 10
Decreases in Estimated Income—			
Coke	£5765 4 10		
Tar	971 8 6		
Sulphate of ammonia	4668 16 11		
Stair lights (charge reduced)	1237 7 2		
Gas appliances	650 15 10		
Other items	15 13 9		
		13,309 7 0	
		£45,267 18 10	
Deduct—			
Decreases in Estimated Expenditure—			
Repairing and fitting up cookers, &c.	£2778 7 11		
General establishment charges	773 4 5		
Compensations	1957 9 8		
Other items	1097 10 5		
	£6606 12 5		
Increases in Income—			
Gas	£5881 17 2		
Other items	211 12 8		
	6093 9 10		
		12,700 2 3	
Estimated reduction of profit			£32,567 16 7

It will be observed that the heavy increase in the cost of coal accounts for a large part of the reduction of profit—in fact, the estimated expenditure would have been very little more than the actual expenditure of last year had coal cost the same per ton. It is not unusual, when coal goes up in price, to obtain better rates for coke; but the Engineer does not anticipate that the abnormal prices received for this commodity last year will be maintained. As it is, he has put down £9288 more than was received in 1911-12. Nor does he expect that sulphate of ammonia will reach last year's level.

On May 15 last there was standing at the credit of net revenue account an unappropriated balance of profit of £30,758 7s. 1d. (the accumulated surplus profits, &c., of three years); so that, if it is decided not to increase the charges for gas, the deficit could be made good without touching the reserve fund.

One penny per 1000 cubic feet on the year's estimated sale of gas is equal to £8382. But it should be pointed out that the rates for public and stair lighting have been fixed to May next; and that any change made in gas prices to private consumers would affect only the second half of the current year—say to the extent of £4900 for each penny per 1000 cubic feet.

Mr. PENNELL said it would be observed that on this occasion the Commissioners found themselves budgeting with a very serious deficiency, and he thought that they ought not to go into another year without letting it be known that, unless there was an improvement in the position, it would be necessary to increase the price of gas.

Mr. LINDSAY, the Convener of the Works Committee, remarked that for the last few years they had always had a surplus balance. These surplus balances had been carried forward as unappropriated balances, and they had been used to the advantage of the Commissioners in the accounts—obviating the borrowing of money and withdrawing from the bank. This year, if they were to leave this out of account, they would have had to budget for an increase in the price of gas to the extent of at least 3d. per 1000 cubic feet; but taking into consideration that during the past year they anticipated a rise in the price of coal, and kept these balances unappropriated, they were now giving the consumers the advantage of the money thus saved. The Committee

realized that if they were to raise the price of gas it would have a bad effect on the increase that had been going on in the consumption. They also anticipated that next year the price of coal would not be so high as at present. Those who advised them fully anticipated that, if they got this year over, there would be no necessity for raising the price of gas.

Mr. M'Michael, the Convener of the Finance and Law Committee, said that in his opinion they had estimated very generously, and in all likelihood things would not turn out so badly as their officials estimated. For the four and a half months already gone, their receipts were practically the same as last year; so that a very great change would have to come over the state of affairs if things were to work out worse.

LEICESTER GAS AND WATER ACCOUNTS.

The accounts of the gas and water undertakings, for the half year ended June 30, were presented and adopted at the quarterly meeting of the Leicester Town Council last Tuesday.

The gas accounts, which were submitted by Alderman T. Smith, showed that the net profit, after paying interest on the capital of the undertaking, was £24,855. Deducting £8054, the half-yearly payment to the sinking fund, and in part payment to the Public Works Loan Commissioners, a balance of £16,801 remained to be applied at the end of the financial year, as the Council directed. Alderman Smith said the sum of £16,801 represented a net decrease of £13,990 on the corresponding period of last year. This decrease looked very much larger, and was somewhat misleading, from the fact that, for the first time in the history of the Corporation, the cost of meters had been taken from revenue, to the amount of £4740. The Council would remember that in presenting the estimate for last half year, he made a promise that the Committee would reduce the cost of gas to large consumers in the present quarter. The Committee had not seen their way to carry out this promise, owing to the increased cost of coal, labour, and materials, and would not be able to do so unless the cost of coal came down much more than it was likely to do. He would rejoice when mining royalties were abolished, and when they could get coal at much cheaper rates than to-day. Coming to the estimate for the next half year, the Committee would not be able, as far as they could see, to meet the promise they made to the Corporation to give them £32,000 for the relief of this year's rates. They estimated that in the coming half year coal would cost £5000 more, the coke sales would be £3000 down, and other residuals £1000 down; and they had schemes to which they were pledged, and which would cost another £1000—making a total of £10,000 in the next half-year's expenditure more than they had in the last half year. They therefore expected that the amount applicable for the relief of the rates would be £25,000, instead of £32,000. The gas-fire hire-purchase scheme was acting very successfully; and the demands for installations were increasing every day. With regard to the vertical retort installation, in consequence of the unrest in the labour world there had been delay; and they would not be able to start the vertical retorts for at least two months. The Council must not expect any relief in this direction in the next half-year's accounts.

The Water Committee reported that the accounts showed a deficiency of £16,002, after paying interest on the capital of the undertaking and the half-yearly payment to the sinking fund, and also after meeting the demands of the Derwent Valley Water Board. Mr. Bryan moved the adoption of the report. Alluding to the Derwent Valley supply, he said the apportionment of the expenditure of the Board had not been settled. It was, however, estimated approximately that the liabilities were £70,000 per annum; and it was thought better to pay down £35,000. This meant an increase of £12,000, as the amount put down last year was £23,000. The loss of £16,000 must not be compared with the £5284 for the corresponding period of last year. The extra liability of £12,000 was not included last year; so that the £16,000 should be compared with a loss of £17,284.

OLDBURY GAS CHARGES.

No Discount for Power Consumers.

At a Meeting of the Oldbury Urban District Council on Friday, the Gas Committee reported that they had considered the question of the price of gas for power purposes, and on the information before them—particularly as regarded the increased cost of production—they recommended that, on and after the next reading of the meters, all accounts for gas used for power purposes be strictly net, and not subject to 5 per cent. discount as hitherto. They intimated, however, that the matter would again be considered when the next coal contract prices were known.

Mr. Tomlinson (the Chairman of the Gas Committee), in moving the adoption of the report, remarked that the Committee were forced to drop the discounts for power purposes on account of the increase in the price of coal, which was costing them 3s. a ton more than a year ago. By stopping the discount, the power users would be better off than if the price were increased by 1d. per 1000 cubic feet; and he mentioned that they were lower in their charges at Oldbury than either West Fromwich or Smethwick. The Committee were anxious to encourage the industries of Oldbury by supplying cheap gas; and as soon as possible they would again have the discount. It would not prevent manufacturers from coming into the town and using gas. Mr. Jones said the price of gas was very low in Oldbury—in fact, they had, he said, cheap gas and high rates.

The report was adopted.

Gas Lighting for the Mansion House Station Subway.—The Gaslight and Coke Company have secured the order for lighting the new passenger subway that has been constructed under the busy crossing between Mansion House Station, Queen Victoria Street, and Cannon Street.

AMSTERDAM MUNICIPAL GAS UNDERTAKING.

Report for the Year 1912.

In the report of the working of the gas undertaking of the Amsterdam Corporation for the year 1912, it is stated that the year was a very favourable one, owing doubtless to the International Gas Exhibition held in September and October. The increase in the output of gas for the first six months was only 1·91 per cent.; but in the second half of the year it was raised to 5·49 per cent.—making the figure for the whole year 3·70 per cent., or in volume 3,366,866 cubic metres (about 118,851,000 cubic feet). The prospects for the future are very favourable. Contracts for gas supply have been made with three of the surrounding communes, so that distribution at a distance will be introduced. For the supply of gas in the parts of the town situated north of the canal, additional gas-works (the fourth) are in course of construction. At the new South works, the various portions of the plant are approaching completion. The installation of thirty settings of eighteen vertical retorts on the Dessau system was completed towards the close of the year; and the wet and dry purifiers and sulphate of ammonia plant were almost finished.

There were delivered into the works 170,654 tons of German coal—viz., 85,663 tons to the West and 84,991 tons to the East works. The delivery of English coal amounted to 58,103 tons, of which 29,448 tons were sent to the West and 28,655 tons to the East works. The consumption of coal for gas production on the two works was as follows:

	West.	East.
German coals	90,236 tons ..	86,157 tons
English coals	25,694 ,, ..	28,226 ,,
Australian cannel	85 ,, ..	62 ,,
Total	116,015 tons ..	114,445 tons

The production of gas per ton of coal was equal to 289·94 cubic metres (10,235 cubic feet) at the West works, and to 298·21 cubic metres (10,527 cubic feet) at the East works—an average of 294·05 cubic metres (10,380 cubic feet). The production of gas during the year was 96,184,400 cubic metres (3,395,309,320 cubic feet), of which 29·55 per cent. was carburetted water gas. For the production of 28,418,650 cubic metres (about 1012 million cubic feet) of water gas there was consumed 16,711 tons of coke, 87,968 tons of gas oil, and 291 tons of petroleum spirit.

The total production of coke was 169,384 tons. For the heating of the retort-settings, 39,499 tons of coal were consumed; and the consumption for other purposes on the works (the water-gas plant and for steam-raising) brought up the total to 57,877 tons. The average consumption of coke for the heating of the settings was equal to 17·15 per cent. of the coal carbonized. The production of coke on the same basis was 72·95 per cent. There were 54,902 tons of coke sold. The coal tar produced was equal to 4·125 per cent. by weight of the coal carbonized—a total of about 9506 tons; and about 2108 tons of water-gas tar were produced. From the nitrogen contained in the coals carbonized, a quantity of 401 tons was gained in the form of ammonia. The treatment of the ammoniacal liquor yielded about 1901 tons of sulphate of ammonia; being equivalent to 18·19 lbs. of sulphate per ton of coal carbonized.

The number of ordinary meters and slot meters is regularly increasing. On the 31st of December last there were 48,514, compared with 46,882 at the close of 1911. The number of prepayment meters in use rose to 70,008 at the end of the year, against 56,846 at the commencement. The proportion of the total sales of gas for which the latter class of meters were responsible was 41·65 per cent., against 40·55 per cent. in 1911. The average consumption of gas by slot-meters is increasing every year, as shown by the following figures:

Year.	Cubic Metres.	Cubic Feet.	Year.	Cubic Metres.	Cubic Feet.
1912 . . .	538	= 18,991	1910 . . .	532	= 18,779
1911 . . .	529	= 18,674	1909 . . .	517	= 18,250

The average consumption of gas per head of the population last year amounted to 155·21 cubic metres, or 5479 cubic feet. The gradual increase is shown by the following figures:

Year.	Cubic Metres.	Cubic Feet.	Year.	Cubic Metres.	Cubic Feet.
1911 . . .	151·0	= 5330	1909 . . .	145·51	= 5137
1910 . . .	150·51	= 5313	1908 . . .	135·02	= 4766

For coal gas, the net cost of production per 1000 cubic metres (35,317 cubic feet) was £2 13s. 6d., and for carburetted water gas £1 18s. 6d.; the average cost of the mixed gas being £2 10s. 1d. Adding the cost of distribution, general expenses, &c., the cost per 1000 cubic metres at the consumers' meters last year was £4 1s. 10d., against £4 6s. in 1911.

After meeting interest and depreciation charges, the working of the undertaking (of which de Heer J. van Rossum du Chattel is the Chief Engineer and General Manager) resulted in a net profit of £179,971.

Wages of Woolwich Arsenal Gas Workers.—Stokers employed in the manufacture of gas in the mechanical engineering department at Woolwich Arsenal were last Monday granted 6s. for an eight-hour shift in place of the present 6d. an hour for irregular periods.

Cirencester Gas Company, Limited.—At the meeting of this Company last Tuesday, the Directors reported that the profit for the year ended the 30th of June last was £3566. Interest on the debentures and the usual interim dividend had been paid; and the Directors recommended a further dividend at the rate of £12, £6, and £8 8s. per cent. on the several classes of shares—making £11, £5 10s., and £7 14s. per cent. for the year. They also recommended placing a further sum of £300 to the contingency fund. The gas sales showed an increase of 1,854,500 cubic feet compared with the preceding year; and there continued to be a steady growth in the demand for prepayment meters, stoves, gas-fires, and radiators. The Directors propose to make a reduction of 2d. per 1000 cubic feet in the price of gas as from the 31st of December next.

THE DOMESTIC USES OF COAL GAS.

How Public Attention was Directed to them Sixty-Six Years Ago.

In view of the efforts now being put forth at the National Gas Exhibition to make the public better acquainted with the great advantages of gas for domestic and industrial purposes, special interest attaches to a paper on "The Domestic Uses of Gas," read before the Society of Arts as long ago as June 9, 1847, by Mr. Alexander Angus Croll—the pioneer of cheap gas in London. As this was one of the earliest attempts made to enlighten the public on the subject in question, we give some extracts from the paper, which has lately appeared in an American contemporary.

The people of England are peculiarly sensible to all that is comprised under the term "comfort," and yet they often overlook or disregard the means by which that comfort may be easily increased. We have, after many years of discussion and persuasion, succeeded in having our streets very effectually and economically illuminated with gas. In that respect "the light of other days" has indeed "faded;" and the obscure glimmerings of impure oil have given way to the refulgent rays of gas. But until within the last few years, and that almost only in the abodes of the wealthy, the use of gas (as a domestic agent) has been little, if at all, known. It may not be out of the way, while passing, here to record the names of a few of the most distinguished of those who have adopted the use of gas in their houses generally, including dining-rooms, drawing-rooms, and sleeping apartments.

The list is headed by Her Majesty the Queen, who is followed by the Duke of Cambridge and other members of the aristocracy, including Sir James Clarke, her physician.

It cannot be supposed that wax candles would have been displaced by gas in the abodes of the before-mentioned families, had not the superior advantages of this light been well ascertained.

But it may be thought that in such establishments the superior illuminating power of gas is preferred without reference to its cost, and that therefore gas-lights, assuming them to be desirable in other respects, are not suited to the general economy of moderate families. Nothing, however, could be farther from the truth. On the contrary, gas-lights are much more economical than those they have supplanted. Let the test of figures be applied, and the truth of this will become evident. It is known that 1000 cubic feet of gas cost 7s. (in London), and that a 15-hole argand burner—the one best fitted for ordinary use, and which affords a light equal to 10 wax candles—will consume only 5 cubic feet of gas per hour. The cost, therefore, of such an argand gas-light is just six-sevenths of a halfpenny per hour. Having then the cost of 1000 cubic feet of gas at 7s. which should be compared with the expense of the ordinary means of illumination, it has been ascertained that 21 cubic feet of gas, costing 2d., are equal in illuminating power to 1 lb. of tallow mould candles costing 7d.; and 25 cubic feet of gas, the cost of which is 2⅜d., are equal to 1 lb. of composition candles, the price of which is 1s., or to 1 lb. of wax candles at 2s. 6d.

Again, 175 cubic feet of gas at 1s. 4¾d are equivalent in light-giving power to a gallon of solar whale oil at 3s. 6d.; and 217 cubic feet of gas, at 1s. 8d., equals a gallon of sperm oil, the price of which is 7s. 8d. As compared, therefore, with tallow candles (the cheapest light used for domestic purposes), the saving by the use of gas would be three-fourths. To intelligent housekeepers, the importance of gas in this point of view will be sufficiently obvious. It is true, dip candles cost something less than moulds; but as they burn more rapidly than moulds, this calculation would be slightly affected by adopting them.

There is a smaller gas-burner than the one just mentioned, called the "fishtail," suited for use in small rooms, passages, servants' offices, and entrance halls, which consumes considerably less gas than the argand burner, which latter, as has been shown, may be maintained at an expense of six-sevenths of a halfpenny per hour.

There are also many situations in dwelling-houses in which a very small light would be found useful. A single-jet burner in these situations will answer the purpose, and if carefully managed will give a constant light equal to that of a single candle, at the expense of only 7s. yearly. One or two such lights in the passages or on the staircases of an ordinary ten-roomed house would altogether obviate the necessity of carrying about candles in moving from room to room.

Not only does gaslight in private dwelling-houses become a source of convenience, but also of safety. How many dwelling-houses have been burnt down from candles accidentally falling, or being left under cupboard shelves, upon the stairs, or from being brought in contact with bed-curtains, window-hangings, and other parts of furniture easily ignited! Against such dangers the use of gas would be, in effect, a complete insurance.

In opposition to these facts, it is stated that danger is incurred in the event of gas being allowed to escape. It is true that the free escape of gas will produce explosion on the introduction of a light; but the objection is completely met by the fact that accidents from this cause are of very rare occurrence. The smell produced by the escape of the smallest quantity of gas gives timely warning to use means for preventing danger.

But though the superior economy of gas has been established, it may be objected that in some instances where gas has been used ceilings have been discoloured, that the light is distressing, the air of the apartment unduly heated and vitiated, and that impurities thrown off—such as ammonia, sulphuretted hydrogen, &c.—tarnish metals, the gilding, and the painted decorations. It cannot be denied that all these drawbacks to the use of gas may have been experienced; but if these are now felt, blame must be attributed to the gas-fitter and the gas manufacturer. The blackening of the ceilings can occur only when a portion of the gas escapes unconsumed, and allows the deposit from smoke. With burners and fittings of proper construction and good materials, these evils can never occur. The smoke arising from gas consumed with well-made burners is an inappreciable quantity, and very considerably less than that produced by a single candle. Gas, in burning, gives no more heat than an equal volume of flame produced from burning candles; but if, in an apartment for the lighting of which two or four moulded candles were deemed sufficient, a volume of gas-light equivalent to ten times the ordinary illumination of candles be used, the fault is not in the gas, but in the use of a quantity of light too great for the size of the room. Precisely the same effect would be produced by burning too many candles. A very little consideration will enable the gas-fitter effectually to prevent the overheating of the apartment. Where rooms have become unpleasantly heated by the use of gas-lights, it has been caused from an excessive quantity of light. The light produced by gas may, if desired, be very conveniently softened and moderated by the use of ground or coloured glass shades, which render the light peculiarly grateful.

As gaslight has been shown to be both more convenient and economical than the ordinary means of illumination by candles or oil, and as the impurities which formerly attended the combustion of gas have been removed, it will be asked: Why is not this means of illumination generally used? It may be answered that builders, in the erection of new houses, have only of late begun to make the necessary provision for the introduction of pipes for gas-lighting, which ere long will be deemed as necessary to a modern house as the pipes for laying on water, and which is the case already in the towns of Scotland. Dundee, for instance, has a population of about 100,000; and it has been shown to Parliament that there are no less than 10,100 gas consumers supplied with gas by the Dundee Gas Companies. It has been supposed that there is some difficulty and considerable expense in fitting-up old houses for gas-lighting. This, however, is not the case, provided a respectable and skilful fitter be employed.

Another obstacle to the use of gas in dwelling-houses is that, whereas the consumption will vary from day to day and from week to week, the gas manufacturer, for his own safety, in giving a contract, must form his estimate on the maximum rate of consumption, and so the cost of gas may be greater than that of the other kinds of light. In this manner, gas, though cheap where the illumination is constantly required, becomes exceedingly costly to consumers whose requirements are only occasionally large. The want of exact means to measure the quantity of gas consumed has long been a drawback to its use. In many places people burn by contract—paying so much per year for so many hours each night. In such cases, the gas companies have officers to see that the lights are extinguished at the proper time. Now there is too much independence about the English character to be thus controlled.

The only instrument known and used for a series of years, and that until a very few years past, for measuring the quantity of gas consumed, is what is well known by the title of a "wet meter." But that instrument, though very ingenious, and an approximation to what was so desirable, by experience was found to be defective in many ways—operating at once against the gas manufacturer and honest consumer, and affording facilities to the fraudulent and dishonest. These facilities principally arose from the measuring capacity of the meter depending on what is called the "water-line," or, in other words, the height of the water in the meter.

Experience also proved that to the use of this instrument there were other objections, such as becoming fixed, by the water contained in the meter freezing, and consequently the supply of gas stopped and the lights extinguished. At another time the same sudden extinction of the lights would take place by the water evaporating out of the meter, and the falling of the float which carried the valve at the outlet, so that the lights were more frequently extinguished when most gas was being used. I shall only mention one other objection to this instrument (although there are many more), which is that it must be placed in the lowest possible situation, in order to allow any water that may be condensed in the tubes from the evaporation of the water out of the meter to descend into it again; and where this is not attended to, jumping or unsteady lights are the consequence. For this reason, water meters are necessarily placed in very inaccessible places, such as cellars, &c.

From these objections and others, a dry gas-meter was considered to be very desirable; and, after many attempts to perfect such an instrument, the author and Mr. Richards patented one in 1844, the principal property of which is its unvarying measuring capacity. The peculiar advantage in the meter arises from the arrangement of the flexible part or joints of the diaphragms. In all former constructions of dry gas-meters, this property had never been achieved; and it is remarkable that in all subsequent patents this indispensable advantage of a meter has been overlooked, with the exception of one which is held to be an infringement on the author's invention.

The author then gave a simple description of the meter, and explained, by the aid of diagrams, the method of reading the index.

It should be remembered also that gas may be advantageously employed in the domestic economy, to the purpose of cooking. As the mode of cooking by gas may not be generally understood, I may explain that in most cases the gas-jets are enclosed in a circular sheet-iron case, with cooking vessels fitted to the same, so that while the cooking process is going on there is none of that waste of heat that takes place with coals and the ordinary chimney.

In roasting by means of gas, the meat is surrounded by small jets of flame—an arrangement by which the necessity of turning is completely obviated. The dripping is received in a state of perfect purity in a pan at the bottom of the apparatus, and the cooking accomplished in a manner greatly superior to that of the ordinary process. For pickles, soups, stews, jellies, or preserves, where a constant and unvarying temperature is indispensably necessary, the capabilities of gas stand unrivalled, as the heat can be furnished at any required temperature, and from that no variation need take place. The author has often caused the liquor in a vessel to boil to the brim, and there remain, without either sinking or boiling over.

The facility with which the apparatus can be brought into operation is an additional advantage, as no preliminaries are required, but only to turn the gas on, and the apparatus is in full operation. When the cooking is completed, the gas can instantly be turned off, so that no waste can occur in hotels, club-houses, and all places where despatch is necessary. This is an object of great importance. It is well known that it is with gas that the great achievements of M. Soyer are being

accomplished at the Reform Club. In hospitals, or even in the private room of the invalid, a jet of gas could be fitted to a vessel, so that anything required could be kept warm during the whole night.

To many it may appear novel to speak of abandoning the use of coal-fires for the purposes already mentioned; but such a result may take place, in the course of a few years, to a very great extent. The advantages of such a consummation as substituting the use of gas for coal are almost innumerable; and to conceive of London freed from all smoke, her dense fogs, and the buildings without their coatings of soot, and the streets cleared of those cumbersome and unwieldy coal-waggons, might better employ the Legislature than many matters that frequently engage their time. Fuel and the means of artificial light would be noiselessly conveyed to all parts of the Metropolis, and all refuse left at the gas-works, instead of, as now, being divided between the atmosphere and the dust-cart.

YORK GAS COMPANY'S NEW PREMISES.

A recent issue of the "Yorkshire Herald" contained an illustrated description of the new premises which have recently been opened by the York Gas Company. They form an important addition to the architectural features of the city; and upon them the Directors have spent about £6000. Those of our readers who are familiar with York will recognize the position of the new offices when they read that they stand at the junction of St. Helen's Square and Davygate. At the square, the building is 40 feet high, and consists of three storeys. On the ground floor is the counting-house; while the rooms above are for the use of the inspector, who has to reside upon the premises in order to be available in cases of emergency. The old part of the building is only two storeys high; the lower floor being utilized for show-rooms and the upper floor for the Secretary's office, &c. The new principal entrance gives access to the public office, behind which is the main clerks' office. These two rooms, which are merely separated by a glazed mahogany screen, extend backwards from the street a distance of some 80 feet. Beyond the main office a large strong-room has been built. It is lined with white glazed bricks, and fitted with one of Milner's fire and burglar proof doors. The present main office is adapted for the purposes of a fittings office, and in connection with it a new Auditors' room has been built. The Board-room remains intact; but various rearrangements of the other rooms have been made for the greater convenience in the working of the departments.

The frontage to Davygate is considerable; and here the Directors have utilized four of the large windows in fitting them up as well-furnished rooms of a house, with all the latest gas equipment, in order that the public may see for themselves how effectively gas can be used in the home, and also how the fittings can be made to harmonize with the furniture. The first window shows an up-to-date bath-room, supplied with hot and cold water; the second has been furnished as a drawing-room; the third is fitted with beautiful antique furniture; while to the housewife the fourth will probably prove the most interesting, as it is set out as a kitchen. The range here is a combination gas and coal one; the grate is designed solely for heating the room by coal; while the ovens are gas-cookers built in as part of the structure. Hot water is supplied by a gas circulator. The range is so planned that it will practically keep the kitchen entirely free from dirt. It is the intention of the Company's Engineer and Manager (Mr. Harold E. Bloor, B.Sc.), who has carried out all the arrangements, to make full use of these rooms in order to show gas appliances for heating, lighting, &c. The various appliances will be repeatedly changed, and every effort will be made to enable the public to fully grasp the value of gas in the home, office, workshop, or factory.

With regard to the interior of the premises, the new counting-house on the ground floor is a spacious and lofty room, provided with ample counter accommodation; and it will be lighted mainly by two semi-indirect fittings. Access can readily be had from the counting-house to the main showroom, which is a particularly fine and spacious one. The guiding principle in displaying the various gas-fittings is to show a comparatively small number of articles to the best advantage. The collection includes pendants, brackets, and globes of many beautiful designs. The various articles are arranged in the actual position they would occupy in an ordinary room. The special feature of the lighting of the room is the "Nonpareil" sun-burner, consisting of a cluster of 16 incandescent lights, having an illuminating power of 1600 candles.

VITALITY AND PROGRESS OF THE GAS INDUSTRY.

An article on "The Gas Industry: Its Vitality and Progress" was contributed by Mr. Thomas Newbigging to the "Daily Chronicle" last Wednesday—the opening day of the National Gas Exhibition. In his own engaging style, the author explained, for the benefit of the public, as fully as was possible within the limits of a newspaper column, the vast developments that have taken place of comparatively recent years in gas enterprise.

In the course of his article, Mr. Newbigging said that at one time, not very long ago, the bulk of the gas produced was consumed in affording artificial light during the dark hours. A marked advance in its use for purposes other than lighting has taken place. In many districts, especially in the larger towns, close on 50 per cent. of the production is now utilized in the day time for domestic use and in a multiplicity of manfacturing trades—in the baking of bread, in cooking of all kinds, in the manufacture of confectionery, coffee roasting, in the gassing of yarns, in dentistry, in jewellery work, wire welding, steel tempering, enamelling, as a source of heat in the gas-fire, as a source of motive power in the gas-engine, and for many other purposes, all of which, adding largely to the day consumption, is tanta-

"After all, there is nothing like a good coal fire."

The above remark was made in a City Office recently by a gentleman who was seated admiringly before a fire which had all the appearance of glowing coal. His astonishment was great when he was informed that the fire which excited his admiration was, in fact, a Gas Fire—Mains' "St. Nicholas."

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mount to reducing the percentage which the capital expenditure bears to revenue, and so enabling reductions to be made in the selling price. And this to the mutual advantage of the gas undertakings, the manufacturing trades, and the general community.

The invention of the incandescent mantle has produced a veritable revolution in gas lighting. By its use, instead of 12 candles' value per cubic foot consumption, we have now an efficiency of 40 candles; and by the application of the system of high pressure, an efficiency of 60 candles per cubic foot is obtained. All this, too, is secured with a marked reduction in the quantity of gas consumed, so that there is a positive saving at both ends.

The improvements that have been effected in gas-fires of very recent years are of the utmost importance. The proportioning of the gas and air supply has been made the subject of careful study on scientific lines by the best makers; and it may be asserted that the gas-fire is now brought to such a high state of perfection that householders may adopt it with confidence in its efficiency and economy as compared with the ordinary coal-fire. In bedrooms, especially, the gas-fire is a boon that can scarcely be over-estimated. Its handiness, cleanliness, constancy without attention, easy regulation, immunity from risk of fire (often caused by sparks from burning coal), and as an aid to ventilation—in all these respects it is simply invaluable. Cooking-ovens and geysers for water-heating for baths and other domestic purposes have been similarly improved.

And what of that grim spectre—the smoke nuisance? It is a matter of common observation that there is a distinct amelioration in many of our large towns in respect of the prevalence of black fogs and in the general purity of the atmosphere, due in great measure to the wide adoption of the gas-fire and the almost universal resort to cooking by gas. Fogs in this climate we are bound to have, less or more, whether in town or country. But the old black fog, with its two and three days' choking persistence, is a thing of the past; and this, too, though the substitution of gaseous for solid fuel has only been partially accomplished. When the change is complete (and it is certain to come), the occasional white or yellow fogs will be evanescent, and shorn of their deadly qualities.

It is a remarkable fact that there is no waste within the gates of a well-managed gas-works. Every product is utilized. Even the scoria and clinker from the furnaces have a marketable value. The industry has been fortunate, too, in directions beyond the scope of what may be termed the personal effort of its members. Illuminating gas is, of course, the staple production of a gas-factory. But this wonderfully complex mineral, coal—which, taken altogether, is the most wonderful of all minerals—yields other substances of secondary importance to gas, which in technical terminology are called bye-products.

The capital directly invested in the industry in the United Kingdom at the present time, reckoning both statutory and non-statutory gas undertakings, amounts to close on £140,000,000 sterling. The coal carbonized is about 17,000,000 tons per annum, the annual gas production is 200,000,000,000 cubic feet, distributed to some 7,000,000 consumers through 38,000 miles of main-pipes. The profit-yielding results of the industry are such that gas property has a reputation for value and stability second to no other class of investment. If account were taken of the collateral trades depending on the industry, the capital sum invested would be materially increased.

The economies which have been effected in the manufacture, distribution, and utilization of gas are a striking proof of the ability and well-directed energies of those in charge of gas undertakings. A word, then for the gas manager, who often gets less than his due. All earnest workers, of whatever kind and degree, are benefactors to the community. But the gas engineer who gives of his best to his employers and the public comes more closely in contact with his fellow-citizens than almost any other public servant, inasmuch as his abilities and devotion to duty have the tangible result of saving their pockets by the reasonable charge he is able to ensure for what is one of the necessaries of life.

HOW TO ABOLISH THE SMOKE NUISANCE.

Suggestions by Mr. F. D. Marshall.

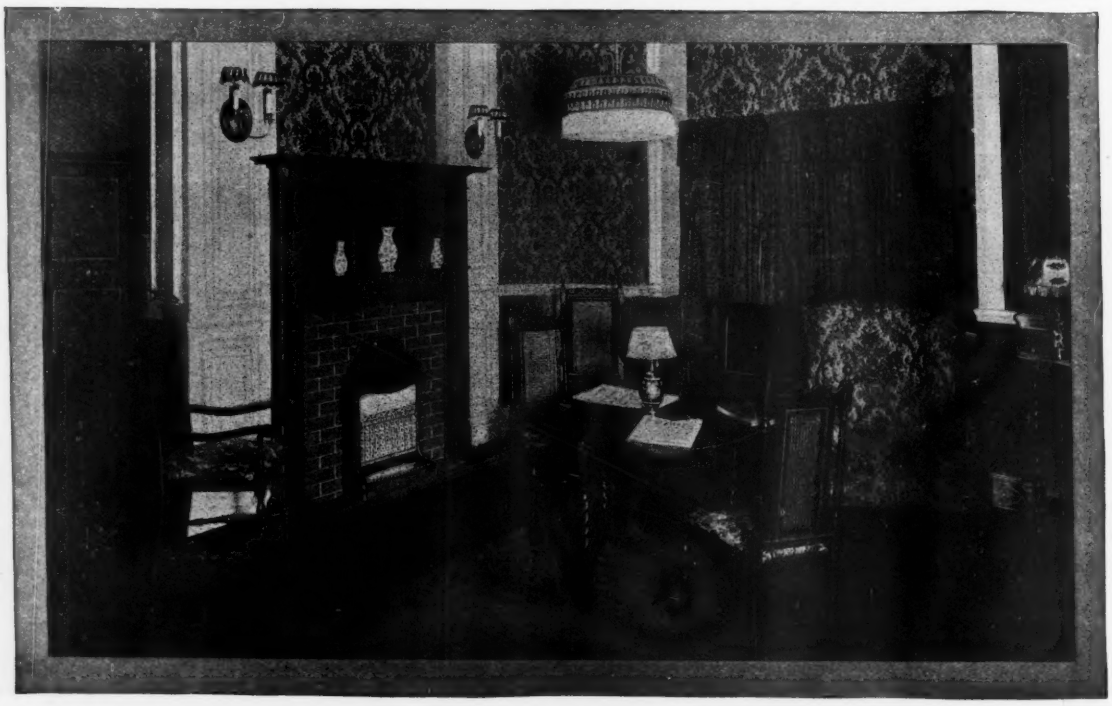
Under the title of "Our Family Gas-Works," Mr. F. D. Marshall had a letter in the "Daily Mail" last Wednesday, in the course of which he made the following remarks.

Has there ever been a census of the number of the domestic chimney-pots in London? I can find no record. On a modest computation, there must be some 2 millions of them, or even more—I do not know. I have seen Vesuvius erupt, and spread over half Southern Italy a murky pall; but Vesuvius is a child in emitting noxious black vapour compared with the combined efforts of the London fireplaces. Every chimney-pot is the shaft for the products of the domestic gas-works; and, from being the fairest city in the world, London becomes during the winter months the blackest, grimiest, and sootiest—barring, perhaps, Manchester, Birmingham, and Liverpool, which do not yield the palm to London in the monopoly of domestic gas-works.

There are over 8 million tons of bituminous household coal consumed in London annually. This coal contains approximately 64,000 million cubic feet of gas, 360 million gallons of good oils (Diesel oil, lubricating oil, and motor spirit), 540 million pounds of ammonia, reckoned as sulphate of ammonia, of an aggregate value of £8,000,000! This is all wasted—hopelessly and absolutely wasted—not in one year only, but in a succession of years; and not only so, but only 10 per cent. or less of the thermic value of the coal is ever realized. Is not it appalling?

Of course, there is a remedy—teach the people the use of a clean, smokeless fuel, giving out a greater heat than the crude coal; teach the purveyors of coal that it is far more profitable first to distil their coal by a low-temperature carbonizing process, extracting the gas, tars, oils,

Richmond's "PERIOD" Gasfires.



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and ammonia, and vending comparatively pure carbon instead; make it clear to the purveyors of coal that in the oils in the coal they hold a national asset which renders the country almost immune from the dangers of importing crude oil from abroad; wake up the lethargic authorities, and compel them to make it penal to burn bituminous, untreated coal in open hearths. The gas companies are doing good work by the introduction of heating and cooking stoves; but the Londoner will never completely abandon his cherished grate fire. Do not talk about the decadent age of coal and the coming of the oil era. If the oil era arrives to stay permanently, the coal measures are ready to meet it; and in converting the coal into oil for national wants, it is at the same time converted by the same process into a splendid smokeless fuel, which if universally used would render London the brightest city in the world, even during the depth of winter.

METER TESTING IN EDINBURGH.

The eighth annual report of Mr. William Gordon (Official Inspector) to the Lord Provost and Magistrates of Edinburgh on the working of the Corporation Gas-Meter Testing Department for the year to May 15 last states that the number of gas-meters tested and examined during the twelve months was 90,730. Of these, 11,971 were wet, and 78,759 dry. Since 1861, there have been 2,708,766 meters tested. Fees of £2527 were collected last year—showing a profit of £995.

Mr. Gordon suggests that, with a view to ensuring uniformity in the method of testing meters specially constructed for measuring the consumption of gas distributed at high pressure, the Legislature should be asked to consider the advisability of amending the Sale of Gas Act, so that rules could be formulated and issued to the meter inspectors throughout the country. He also thinks it would be in the interests of the seller and the consumer of gas if a system of compulsory re-verification of gas-meters was incorporated with any suggested amendment of the existing Act. It is pointed out that, under present conditions, an official inspector has no power to examine and test a meter for exactness, no matter how long it has been installed, unless authorized by the seller or the consumer. A meter was recently submitted to the department for inspection, bearing a metal stamp No. 29, and the maker's badge dated 1865. From the appearance of the official stamp and the meter, it could be assumed that the instrument had never been re-verified or repaired since the date of its manufacture; and it was found to be 29 per cent. slow when tested under the conditions prescribed by the Act. Periodical re-verification would, Mr. Gordon urges, probably further popularize the use of gas, as the greater the efficiency of the meter the less cause there would be for friction between the consumer and the seller.

Of the 78,759 dry meters tested last year, 532 were rejected as incorrect; and of the 11,971 wet meters, 23 were rejected.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

Scotland has been well to the fore at the National Gas Congress. Lord Provost Inches, the Chairman of the Edinburgh and Leith Gas Commissioners, was entrusted with the duty of seconding the Lord Mayor of London in his wishes for the success of the exhibition and congress, and in doing this he was very happy. It is not every city that has interesting points about gas that can be mentioned on such an occasion; but, as representing the capital, and speaking on behalf of Scotland generally, he was able to point out that gas was a Scottish invention. He had to own that Glasgow had beaten Edinburgh in being the first to adopt gas lighting; he said Glasgow always led. Its motto was: "Let Glasgow flourish by the reading of the Word." Whether it read the Word or not he did not know, but it flourished. Sir Walter Scott's connection with the Edinburgh Oil-Gas Company was also news to many. He claimed the present as the "Gas Age." Glasgow's representative, Lord Provost Stevenson, fresh from his trip to the American Continent, also wished the exhibition success. He claimed that he had a gas-works which operated every Thursday afternoon. It generated much heat and sometimes a good deal of light. Some people thought it always generated light; but critics were not always of the same opinion. These remarks caused several outbursts of laughter; but his reference to keeping the air unpolluted by smoke by the use of gas fires and cookers, so that the sun could purify, was in a more serious vein, and was very well received. It is to be hoped the Canadian municipalities whom he advised to adopt high-pressure gas lighting, as practised in Whitehall, will see the force of his recommendation, and act upon it.

Bailie Paxton, of Glasgow, kept the Scottish end up when he took the chair and introduced Professor Vivian B. Lewes. As would be expected, he referred to smoke prevention—a subject he has very much at heart. He mentioned that Glasgow had 177,000 gas appliances in use by the people of that city. Next week Mr. Henry O'Connor will deliver four popular lectures at the exhibition; and he has been so long resident in Scotland, and has also lectured at the Technical Colleges at Edinburgh and Glasgow, that he can almost be called a Scotsman. A good number of Scottish Gas Managers have also attended, and others intend doing so later on.

Despite the undoubted success of the congress and exhibition, and the prominence given to the Edinburgh representative, Bailie Pennell objected to the contribution of fifty guineas being made to the funds by the Edinburgh and Leith Gas Commissioners. He claimed that they were making this grant outside the scope of their business. The Lord Provost pointed out that it was being done to improve their business. Bailie Pennell's protest was, however, recorded. The Treasurer, Mr. Canning Williams, reported that he anticipated a 2½ per cent. increase, and, in view of the enhanced price of coal, he suggested that any deficit could be made good out of the unappro-

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priated balance of profit of £30,758 which has grown up during the last three years. Bailie Lindsay, the Chairman of the Works Committee, pointed out that without this surplus the price would have had to be raised at this stage by 3d. per 1000 cubic feet. The objection of Bailie Pennell to the use of this money was met by Bailie Harvey, who said it was a question of giving back to the consumer what they had taken from him during the last three years. It was decided to retain the present price of gas. The high-pressure installation in three streets near the centre of the town has now been lighted up, and this will be noticed later, when the scheme has been tried for a short while. The Electric Lighting Committee have recommended to the Edinburgh Town Council that the price of current should be reduced by ½d.—from 2¾d. to 2¼d. per unit.

Mr. W. Gordon, the Chief Inspector of Meters in Edinburgh, recommends that the Legislature should be asked to consider the advisability of amending the Sale of Gas Acts, 1859-60, so that gas distributed at high pressure can be measured properly by the laying down of a uniform method of specially testing the meters. He also recommends a compulsory re-verification of gas-meters. This he thinks would avoid friction between consumers and sellers. He recently tested a meter 48 years old, which did not appear to have been re-verified or repaired during that time. The meter was 29 per cent. slow. The lucky consumer, at any rate, would not be anxious for re-verification of his meter. But there is no doubt that the re-testing of meters in use is an excellent thing, and would well repay the expense. Unfortunately, a really portable test-holder has not yet been devised, and the expense of disconnecting the one meter, substituting another, carriage to the works, testing, and replacing at another consumer's, is a large one, which companies and corporations are loth to incur. Mr. Gordon also carries out tests of the illuminating power of the gas supplied by the Commissioners, and, curiously enough, he brings the average to exactly the same hundredth of a candle as in 1911—namely, 16·81 candles. A point of considerable importance at the present time for incandescent burners is the variation from the mean, as this indicates whether the adjustment of the gas and air inlets to bunsen burners has been necessary. The maximum test during the year was 17·93, and the minimum 15·72; so that the former was 1 12 and the latter 1·09 candles from the average of 16 81. This is, perhaps, not very much; but, with carburetted water gas to correct with, it is more than might have been expected.

The Banchory Gas Company propose to reduce the price of gas to 5s. 10d. per 1000 cubic feet, and for gas cookers to 5s. The Chairman, Mr. T. Davidson, stated that this price of 5s. 10d. was practically the average charge in the small towns of Scotland; and, in view of the distance of Banchory from the coal pits, it was very satisfactory. Further extensions at the works are in contemplation. He stated that electricity, for a town of their size (the population is given as 3377), was absolutely hopeless, and he had come to this conclusion after the Directors had considered the introduction of this illuminant. Inverurie, with a population of 4425, is, however, to allow a firm of electrical engineers in Aberdeen to put forward a scheme for lighting the burgh by electricity, although this does not bind the Council to accept it. It is to be hoped that the Council will make sure that the scheme does not involve them in the expenditure of much money, or they will find themselves with a white elephant with a large appetite.

The Rothesay Town Council have agreed to the recommendation of the Gas and Finance Committee to extend the works at an expenditure of £19,650, which includes £10,000 for vertical retorts and £7700 for an additional holder.

The Slamannan New Gas Company, recently formed to take over the concern of the old Company, are moving with the times. The Directors have carried out extensive alterations, and put in new retorts and greatly improved the quality of the gas. They are now advertising that they are ready to overhaul, free of charge, old gas connections and meters, and fit new connections and new meters—ordinary or prepayment as desired—for prospective customers. They also supply and fix grillers or boiling-rings free of charge.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Oct.* 4.

Sulphate of Ammonia.

Throughout the week the market for this material has remained idle, and in the absence of large orders from any quarter it has only been possible to effect sales at a reduction in prices. Direct buyers have become rather apathetic, while dealers have not shown much keenness in purchasing. The nearest values at the close are £13 7s. 6d. per ton f.o.b. Hull, £13 10s. per ton f.o.b. Liverpool, and £13 12s. 6d. per ton f.o.b. Leith. The weakness in the near position has checked the demand for future delivery, and no first-hand business has been reported.

Nitrate of Soda.

There has not been much inquiry for this article, and prices are barely steady at 10s. 9d. per cwt. for ordinary and 11s. for refined quality, on spot.

LONDON, *Oct.* 6.

Tar Products.

The markets for tar products remain quiet, and prices keep fairly steady. No business of particular note is reported in pitch during the past week. Consumers are still holding off, and will not pay the prices being asked at the moment. There certainly appears to be more offering; and makers in some quarters have been more reasonable in their ideas of value. Benzol continues firm. Solvent and heavy naphthas are quiet; but a little business has been reported. As to creosote, the inquiry is fairly good, and prices are well maintained. There is still no business in crude carbolic.

The average values during the week were: Tar, 29s. 3d. to 33s. 3d.;

pitch, London, 44s. to 45s.; east coast, 44s. 6d. to 45s.; west coast, Manchester, 43s. to 43s. 6d.; Liverpool, 44s. to 44s. 6d.; Clyde, 44s. 6d. to 45s. Benzol, 90 per cent., naked, London, 1s. 1d. to 1s. 1½d.; North, 11½d. to 1s.; 50-90 per cent., naked, London, 1s. to 1s. 0½d.; North, 11d. Toluol, naked, London, 10½d. to 11d.; North, 10½d. to 11d. Crude naphtha, in bulk, London, 5½d. to 5¾d.; North, 5d. to 5¼d. Solvent naphtha, naked, London, 10½d. to 10⅝d.; North, 9¼d. to 9½d. f.o.b. Heavy naphtha, naked, London, 10d. to 10⅛d. f.o.b.; North, 9d. to 9¼d. f.o.b. Creosote, in bulk, London, 3⅜d. to 3½d.; North, 2⅞d. to 3d. Heavy oils, in bulk, London, 3½d. to 3⅝d. Carbolic acid, casks included, 60 per cent., prompt, east coast, 1s. 2½d. to 1s. 3d.; west coast, 1s. 2d. to 1s. 2½d. Naphthalene, £4 10s. to £10; salts, 50s. to 55s., bags included. Anthracene, "A" quality, 1¼d. to 1¾d.; "B" quality, nominally ¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

There has again been a decidedly quiet week, and prices have receded a little. Of course, in many quarters manufacturers still quote the high values; but no business is being done at anything like their figures. In London to-day, it would not be possible to obtain more than £12 13s. 9d. to £12 15s.; Hull, £13 8s. 9d. to £13 10s.; Leith, £13 11s. 3d. to £13 12s. 6d.; Liverpool, £13 10s.; Middlesbrough, £13 10s.

Manchester District Tar Prices.

It is officially announced that the average price realized for August deliveries of tar in the Manchester district—based on the value of the products—was 34s. 9d. per ton.

COAL TRADE REPORTS.

Northern Coal Trade.

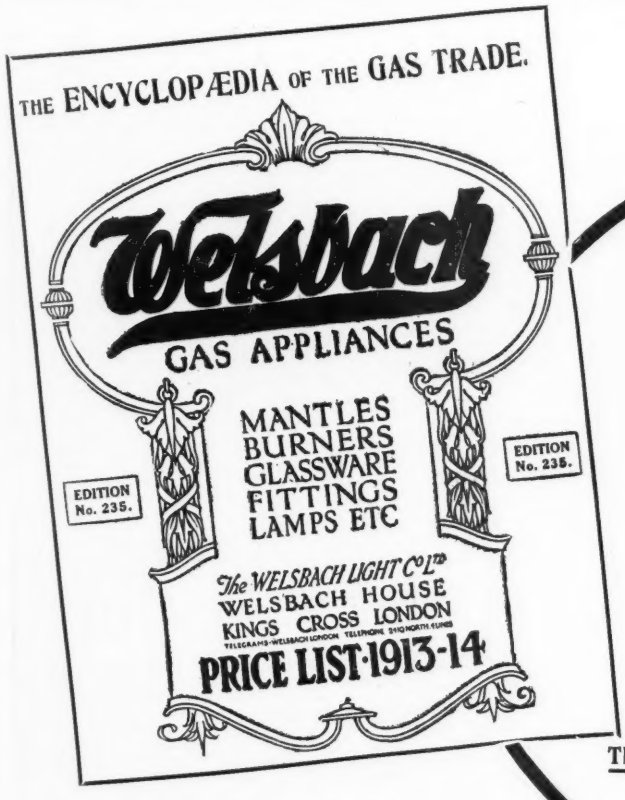
The coal market is rather steady, though the shipments are restricted from some of the ports. In the steam coal trade, best Northumbrians are from 14s. 9d. to 15s. per ton f.o.b.; second-class steams are 12s. 9d. to 13s. 3d. per ton; and steam smalls are from 7s. 6d. to 9s. 6d. The output is not now so much restricted by local stoppages; but the getting away of coal cargoes is influenced by the difficulty with the workers on steam tugs. In the gas coal trade, the demand is steadily increasing both for home and foreign needs; and the prices are firmer. Best Durhams are from 15s. 3d. to 15s. 6d. per ton f.o.b.; this class being scarce. Second-class gas coals are from 14s. to 14s. 3d. per ton; and "Wear Specials" are steady at 15s. 6d. per ton f.o.b. Forward sales of gas coals are reported for next year's delivery at Genoa at a little over 20s. per ton there; while for earlier delivery, the price is slightly higher. Tenders are sought for coals for the gas supply of Christiania; but the quantity is not heavy. There is a better inquiry for coke. Though gas coke is in larger output, the price is firm at 17s. 6d. to 17s. 9d. per ton f.o.b. in the Tyne.

Scotch Coal Trade.

Throughout the week the main feature of the Scottish coal trade has been the bookings for next year; the tendency being to hold out for enhanced prices. Otherwise, the market is firm, with a steady demand for all classes of coal. On the Glasgow Coal Exchange on Friday, the following were the approximate prices quoted: Ell coal, best brands, 13s. to 13s. 3d.; splint, 13s. to 15s. 3d.; Navigations, 15s. to 17s.; steam, 13s. to 14s. 6d.; Hartleys, 15s.; trebles, 13s. 9d.; doubles, 12s. 6d. to 12s. 9d.; singles, 11s. to 11s. 6d.; pearls, 9s. 6d. to 9s. 9d.; dross, 8s.—f.o.b. Glasgow.

Bridgwater Gas Company.

Proposing the adoption of the report and accounts at the seventy-ninth annual meeting of the Bridgwater Gas Company, Mr. R. Y. Foley congratulated the proprietors on the pleasing results of the past year's business, in spite of the very large increases in the cost of coal and oil. The new retort-house erected during the past year was now completed and at work; and it was already apparent that very considerable economies would result therefrom. An issue of £6000 of new 5 per cent. "C" stock had realized a premium of nearly £500, which was a practical proof of how much the Company's stock was approved of as an investment. The report was adopted, and the payment of standard dividends agreed to. In moving the re-election of Mr. J. H. Cornish as Secretary and Manager, the Chairman referred to the good relations existing between the Directors and the management. These had ever been of a most cordial character, and appeared to have been handed down from father to son in the case of the Bridgwater Gas Company with advantage to both sides. Only last year Mr. Cornish presented to them his plans on paper for the new work which had now reached completion. It had been a big job, and had been carried through without a hitch or extra help by Mr. Cornish, whom he congratulated on the successful completion. A word of thanks was also due to the various contractors. First of all West's Gas Improvement Company, who were responsible for the retort-house and machinery; next to Messrs. H. W. Pollard and Sons, for the excellent work done in building the coal-store and engine-rooms; and, lastly, to Messrs. Ashton and Sons, for their work on the foundations, which was of a particularly arduous and extensive nature. Mr. Cornish had been well supported throughout the year by the foreman of the works and the office staff, to all of whom the proprietors were much indebted. Responding, Mr. Cornish remarked that it would have been impossible to carry successfully to completion so big an undertaking without the united and unswerving support of the Directors, who had not hampered him in any way. It had been a year of big expenditure; but, judging from the results already obtained, a good return on the capital expended was well assured. A vote of thanks to the Chairman and Directors brought the meeting to a close.



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Electric Light Failure at Leeds.—With only a few seconds' warning, on Monday evening of last week, at about seven o'clock, the electric light failed in Leeds. The streets, restaurants, &c., were, of course, at that hour crowded, and much inconvenience was caused; but, fortunately, after about a quarter of an hour the light returned. In the interval gas naturally received a good advertisement.

Water Supply in the Abingdon District.—Three inquiries have been held by Mr. W. M. Cross, M.Inst.C.E., of the Local Government Board, with reference to applications made by the Abingdon Rural District Council for sanction to borrow sums of £2800, £1000, and £150 for water supply purposes at Sutton Courtney, Sunningwell, and Steventon respectively. At Steventon, where there is already a public supply, £150 is needed to carry out additional works; at Sutton Courtney, it is proposed to establish a means of supply by works at Milton Hill at a cost of £2800; while at Sunningwell the existing works are to be taken over and extended.

Gas-Fitters' Grievance at Newry.—A memorial signed by the local gas-fitters was presented to the Newry Urban District Council last week, in which exception was raised to the Council's gas manager undertaking, for payment, the cleaning and repairing of gas-fittings, burners, &c., in the dwellings and business premises of the gas consumers. The memorialists expressed appreciation of the desire to make the gas undertaking pay, and to improve the methods of management, but objected to competition with them in this form. If, they said, it was intended to enter into competition, the Gas Committee ought to create a new department, and open proper business premises. The Council considered the matter at some length, and decided to call for a report from the Gas Committee.

The Drogheda Gas-Works Fatality.—Inquests were held last week on William Finegan and Edward Carolan, whose deaths resulted through the collapse of a scaffolding on which they were at work during the construction of a gasholder at the Drogheda Gas-Works, as recorded in the "JOURNAL" last week. Evidence was given as to the distribution of weight by the men working on the scaffolding. Mr. J. M'Gowan, draughtsman to the Contractors (Messrs. Hanna, Donald, and Wilson, of Paisley), said that it would be both unusual and dangerous to have a netting or canvas underneath the men, for if any considerable weight should fall, it might tear the whole scaffolding down. He added that the firm had never had a serious accident before. James Wynegate, foreman, said the pole on which the plank rested where deceased worked was new timber; but he found that it was not so sound as he had thought it was on a mere external examination. It was put up in such a way as to give the maximum of security. The Jury returned verdicts showing that death in each case was due to the breaking of an unsound pole of the scaffolding, and that no blame attached to the Contractors or their foreman. An opinion was, however, expressed that greater precautions should be taken in the erection of scaffolding.

The Cranbrook Gas Company, Limited, has been registered with a capital of £2500, in £10 shares.

The Guisborough Water Company, Limited, has been registered with a capital of £17,000, in £1 shares.

The Biddulph Urban District Council have approved of the plans, specifications, and estimates of their Consulting Engineer (Mr. J. H. Brearley) in connection with the purchase of the gas-works, and have agreed to make application to the Local Government Board to sanction a loan of £10,500.

An offer by the Gas Committee of the Wokingham Corporation to supply Gas for public lighting during the year ending Sept. 30, 1914, on the following terms per annum has been accepted: For lights burning from sunset to midnight, £2 7s. 6d. per light; for lights burning from sunset to dawn, £4 15s.

At the meeting of the Spalding Rural District Council on Monday last week, an estimate was presented of the cost of the proposed water scheme for Deeping St. Nicholas. Mr. Silcock, of Leeds, the Engineer consulted, put the total cost at £2583; and it was decided to apply to the Local Government Board for a loan for this amount.

We have received from the Welsbach Light Company, Limited, of 344 to 354, Gray's Inn Road, King's Cross, W.C., their new season's catalogue. It consists of upwards of 200 large quarto pages, and so fully justifies its title of "The Encyclopædia of the Gas Trade." Special attention may be called to the mantle section, which is exceptionally large (occupying 27 pages), and furnishes illustrated particulars of probably the most complete range of mantles ever contained in a gas-lighting catalogue. In the other sections many new and interesting specialities in burners, brackets, pendants, glassware, &c., will be found; and reference to them is facilitated by an index.

At the meeting of the Municipal Water-Works Association in Glasgow last Thursday, Lord Provost Stevenson, in proposing at the luncheon the toast of "The Association," said he could hardly conceive anything more necessary in municipal life than an Association such as theirs, because the question of water supply was cropping up in one part or another of the country every year. Referring to the anomalies of the present rating of water undertakings, he said no man connected with public works could have failed to notice the stupid state of the law as at present existing in this regard. The question of valuation should be dealt with in a drastic manner. There was room for very great improvement. He observed that the Public Health (Acquisition of Water) Bill was considered by their Association, and that they decided to oppose it. In this connection, he noticed that they recommended that where schemes were shown to have been promoted without due cause, or to have been improperly put forward, the promoters should pay the costs of opposition. He found no fault with this, but he would like them to add a clause—viz., that where a wise scheme was improperly opposed the opponents should pay the costs of opposition.

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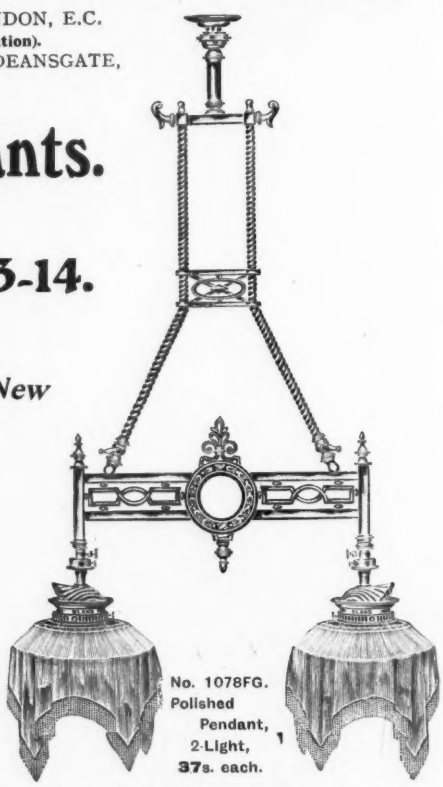

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WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

LADY DEMONSTRATOR. Birkenhead Gas Undertaking. Applications by Oct. 9.

MANAGER AND SECRETARY. No. 5795.

ANALYTICAL CHEMIST. Cardiff Gaslight Company. Applications by Oct. 29.

ASSISTANT RENTAL CLERK. Smethwick Gas Department. Applications by Oct. 22.

SHOW ROOM ATTENDANT. Merthyr Tydfil Gas Company.

Agency Wanted.

COAL AND PIPES. No. 5797.

Manufacturer Wanted.

PATENTEE. 10, Cranley Place, S.W.

Sale of Gas Fittings, &c.

(MR. R. WENTWORTH'S STOCK), Oct. 9 and 10. Particulars of Henry Butcher, 63 and 64, Chancery Lane, W.C.

Stocks and Shares, Sales of.

BARBADOS GAS COMPANY. London Mart. Oct. 21.

CHRISTCHURCH GAS COMPANY. London Mart. Oct. 21.

DARTFORD GAS COMPANY. London Mart. Oct. 21.

ENFIELD GAS COMPANY. London Mart. Oct. 21.

STANFORD-LE-HOPE GAS COMPANY. London Mart. Oct. 21.

SUTTON GAS COMPANY. London Mart. Oct. 21.

TENDRING HUNDRED WATER COMPANY. London Mart. Oct. 21.

WANDSWORTH WIMBLEDON AND EPSOM GAS COMPANY. By Tender. Oct. 13.

UXBRIDGE GAS COMPANY. London Mart. Oct. 28.

TENDERS FOR

General Stores (Couplers, Cocks, &c., Birches, Castings, Limestone, Meter Boards, Tin Pans, Grids, &c., Bogie Wheels, Rake Heads, &c.)

GLASGOW GAS DEPARTMENT. Tenders by Oct. 9.

Lamps.

CALCUTTA CORPORATION. Tenders by Jan. 5.

Mantles.

CALCUTTA CORPORATION. Tenders by Nov. 17.

Oxide (Spent).

SALFORD GAS DEPARTMENT.

Pipes, &c.

GLASGOW CORPORATION GAS DEPARTMENT. Tenders by Oct. 9.

Retort Mountings, &c.

GLASGOW CORPORATION GAS DEPARTMENT. Tenders by Oct. 9.

Tar Distillation Plant.

DUNDEE GAS DEPARTMENT. Tenders by Oct. 27.

GAS COMPANIES' STOCK AND SHARE LIST.

Week after week for a long time past a continuous state of dulness and depression and semi-stagnation has had to be chronicled; and it would indeed be a pleasing task to herald the termination of this gruesome theme. But the monotonous dirge of the markets still continues unabated. For that matter, some observers declare that things have gone from bad to worse, and that the oldest cannot recall a period of greater depression. This may, perhaps, be a slight exaggeration; but it cannot be very far off the truth. Anyhow, last week was worse than its debilitated predecessor; and all the chief markets scored a further fall. The opening day was cheerless, and everything was quiet and dull without a bright spot anywhere. Government issues were heavy, and Consols fell ⅛. Rails were hardly touched; and they gave way where touched. American and Foreign were weaker. Tuesday was a poor day, with markets very idle and disposed to mope, but perhaps not quite as bad as Monday. Consols held on unchanged, and Rails had a few rises interspersed with the falls; but Americans could not amend. Wednesday was dull, though some markets were less despondent; and there was little, if any, acceleration of business. Gilt-edged were depressed by money movements. Rails were firmer here and there, but with weak patches. American partially recovered. Thursday was very quiet, and mostly dull. Only American showed any strength. Money tightness and a 5 per cent. Bank rate knocked another ½ off Consols. Rails were upset by the distressful labour agitation; and the Foreign Market was quite weak. Friday was dismally dull. Pressure to sell from the Continent, and the usual realizing to which one is accustomed on Fridays, depressed prices all round. Government issues were weaker, Rails could find no comfort in the labour outlook, and other leading departments drooped. On Saturday, everything, except Transatlantics, was in very poor case, mainly attributable to Continental sales. Consols receded another ⅛, closing at 73 to 73¼—a fall of ⅜ in the week. In the Money Market, the event was the raising of the Bank rate to 5 per cent. from the 4½ per cent. fixed on the 17th of April. Business in the Gas Market showed some improvement. There was more life in it; and some issues were in evidence which less frequently emerge into notice. The general tone, too, was quite satisfactory. In Gaslight and Coke issues, the ordinary was steady; all transactions being within the range of 102 to 102½. In the secured issues, the maximum marked from 74⅜ to 75½, the preference from 94⅛ to 95⅜, and the debenture from 73 to 74. South Metropolitan was unchanged at 109 to 110¼, and the debenture made 73 and 73⅜. In Commercials, the 4 per cent. realized 105¼, the 3½ per cent. 102¼ and 103¾, and the debenture 72¼. Among the Suburban and Provincial group, Alliance and Dublin fetched 59¾ to 62, British 45, South Suburban debenture 115¼ and 116, Wandsworth "A" 157¾, and (on the local Exchanges) Liverpool "B" 143, ditto debenture 97, and Newcastle 99⅞. In the Continental companies, Imperial marked 164½ to 166, Union 80½ to 81¾, ditto preference 124, European 18½, and Tuscan debenture 97. Among the undertakings of the remoter world, Bombay changed hands at 6⅛, Monte Video at 12⅛, Primitiva at 6¼ and 6 3/16, ditto preference at 4 3/32 and 5 3/32, and San Paulo debenture at 50 and 50¼.

Issue.	Share.	When ex Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,551,868	Stk.	April 11	4†	Alliance & Dublin Ord.	58–63	..	6 7 0
374,000	,,	July 11	4	Do. 4 p.c. Deb.	80–83	..	4 16 5
280,000	5	April 11	7½	Bombay, Ltd.	6½–6⅝	..	5 11 1
50,000	10	Aug. 28	15	Bourne- mouth Gas and Water	10 p.c. 28½–29½	..	5 2 2
347,500	10		7		B 7 p.c. 14⅝–15¼	..	4 11 10
75,000	10	,,	6		Pref. 6 p.c. 13½–13⅝	..	4 7 3
380,000	Stk.	Aug. 14	14	Brentford Consolidated	262–267	..	5 4 10
380,000	,,	,,	11	Do. New	198–203	..	5 8 5
50,000	,,	,,	5	Do. 5 p.c. Pref.	111–113	..	4 8 6
206,250	,,	June 13	4	Do. 4 p.c. Deb.	94–96	..	4 3 4
217,380	Stk.	Aug. 28	11	Brighton & Hove Orig.	201–206	..	5 6 10
244,200	,,	,,	8	Do. A Ord. Stk.	148–151	..	5 6 0
530,000	20	Sept. 26	12½	British	44–45*	..	5 11 1
120,000	Stk.	June 27	4	Do. 4 p.c. Deb. Stk.	87–89	..	4 9 11
245,771	Stk.		4	Buenos Ayres 4 p.c. Deb.	83½–91½	..	4 7 5
100,000	10	,,	—	Cape Town & Dis., Ltd.	2–3	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	4–5	..	—
100,000	Stk.	June 27	4½	Do. 4½ p.c. Deb. Stk.	75–80	..	5 12 6
157,150	Stk.	Aug. 14	5	Chester 5 p.c. Ord.	107–109	..	4 11 9
1,513,280	Stk.	Aug. 28	5/9/4	Commercial 4 p.c. Stk.	105–107	..	5 2 1
560,000	,,	,,	5½	Do. 3½ p.c. do.	102–104	..	5 2 6
475,000	,,	June 13	3	Do. 3 p.c. Deb. Stk.	71½–73½	..	4 1 8
800,000	Stk.	,,	4	Continental Union, Ltd.	80–83	..	4 16 5
200,000	,,	,,	7	Do. 7 p.c. Pref.	124–126	..	5 11 1
492,270	Stk.	—	5	Derby Con. Stk.	123–124	..	4 0 8
55,000	,,	—	4	Do. Deb. Stk.	102–104	..	3 16 11
1,002,180	10	July 30	10	European, Ltd.	17½–18½	..	5 8 1
16,386,660	Stk.	Aug. 14	4/17/4	Gas- light and Coke	4 p.c. Ord. 101–103	..	4 14 6
2,600,000	,,	,,	3½		3½ p.c. max. 74–77	..	4 10 11
4,062,235	,,	,,	4		4 p.c. Con. Pref. 93–96	..	4 3 4
4,674,850	,,	June 13	3		3 p.c. Con. Deb. 73–75	..	4 0 0
258,740	Stk.	Sept. 11	5	Hastings & St. L. 3½ p.c.	87–89	..	5 12 4
82,500	,,	,,	6½	Do. do. 5 p.c.	—	..	—
70,000	10	April 25	11	Hongkong & China, Ltd.	17¼–17⅝	..	6 3 11
131,000	Stk.	Sept. 11	7⅜	Ilford A and C	150–153	..	4 19 8
65,780	,,	,,	6⅛	Do. B	118–120	..	5 2 1
85,500	,,	June 27	4	Do. 4 p.c. Deb.	89–91	..	4 7 11
4,940,000	Stk.	May 16	9	Imperial Continental	163–168	..	5 7 2
1,335,000	Stk.	Aug. 14	8⅛	Do. 3½ p.c. Deb. Red.	83½–85½	..	4 1 10
200,242	Stk.	Aug. 28	6½	Lea Bridge Ord. 5 p.c.	118–121	..	5 3 4
561,000	Stk.	,,	10	Liverpool United A	206–208	+2	4 16 2
718,100	,,	,,	7	Do. B	141–146	+2	4 15 11
306,083	,,	June 27	4	Do. Deb. Stk.	96–98	..	4 1 8
63,480	Stk.	June 27	3	Maidstone 3 p.c. Deb.	66⅛–68½	..	4 7 7
75,000	5	June 13	6	Malta & Mediterranean	4⅜–4⅞	..	6 3 1
250,000	100	Oct. 1	4½	Met. of Melbourne	4½ p.c. Deb. 96–98*	+¼	4 11 10
541,920	20	May 30	4	Monte Video, Ltd.	12–12½	–¼	6 8 0
1,775,892	Stk.	July 30	4½	Newc'tle&G'tesh'd Con.	99½–100½	..	4 9 7
529,705	Stk.	June 27	3½	Do. 3½ p.c. Deb.	83½–84½	..	4 2 10
55,940	10	Aug. 28	7/10/6	North Middlesex 7 p.c.	12⅞–13⅛	..	5 11 5
300,000	Stk.	May 16	8	Oriental, Ltd.	124–129	..	6 4 0
60,000	5	Sept. 26	10	Ottoman, Ltd.	8–8⅛*	..	5 17 8
60,000	50	Aug. 14	13	Portsea, Island B	122–125	..	5 6 1
100,000	50	,,	12	Do. C	119–122	..	4 18 4
249,980	5	May 16	8	Primitiva Ord.	6–6¼	..	6 3 1
499,960	5	June 27	5	,, 5 p.c. Pref.	4 13/16–5 1/16	–1/16	4 16 5
521,600	100	June 2	4	,, 4 p.c. Deb.	93–95	..	4 4 3
346,198	Stk.	June 27	4	River Plate 4 p.c. Deb.	90–92	..	4 7 0
275,000	5	Sept. 26	12	San Paulo, Ltd.	—	..	—
150,000	10	,,	6	Do. 6 p.c. Pref.	11–11⅛*	..	5 4 4
125,000	50	July 1	5	Do. 5 p.c. Deb.	49–51	..	4 18 0
135,000	Stk.	Aug. 28	10	Sheffield A	220–222	..	4 10 1
209,984	,,	,,	10	Do. B	220–222	..	4 10 1
533,500	,,	,,	10	Do. C	220–222	..	4 10 1
90,000	10	May 30	7½	South African	10–11	+½	6 16 4
6,429,895	Stk.	Aug. 14	5/9/4	South Met., 4 p.c. Ord.	109–111	..	4 18 6
1,895,445	,,	July 11	3	Do. 3 p.c. Deb.	73–75	..	4 0 0
209,820	Stk.	Aug. 14	8½	South Shields Con. Stk.	157–159	..	5 6 11
952,795	Stk.	,,	6	S'th Suburb'n Ord. 5 p.c.	115–117	..	5 2 7
60,000	,,	,,	5	Do. 5 p.c. Pref.	113–115	..	4 6 11
117,058	,,	June 27	5	Do. 5 p.c. Deb. Stk.	115–117	..	4 5 6
594,740	Stk.	May 16	5	Southampton Ord.	102–105	..	4 15 3
120,000	Stk.	Aug. 14	7⅜	Tottenham and	A 5 p.c. 136–139	..	5 6 1
513,940	,,	,,	5⅝		B 3½ p.c. 114–116	..	5 1 3
149,470	,,	June 27	4	Edmonton	4 p.c. Deb. 90–92	..	4 7 0
182,380	10	,,	5	Tuscan, Ltd.	5–6	..	8 6 8
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	96–98	..	5 2 0
236,476	Stk.	Aug. 14	5	Tynemouth, 5 p.c. max.	111–113	..	4 8 6
30,000	Stk.	Aug. 28	8⅜	Wandsworth, Wimbledon, and Epsom— A 5 p.c.	155–160	..	5 4 8
255,636	,,	,,	6⅝	,, B 3½ p.c.	132–137	..	5 0 4
108,075	,,	,,	5/17/3	,, C 3½ p.c.	110–115	..	5 2 0
352,000	,,	,,	6¼	Wimbledon 5 p.c.	111–116	..	5 5 7
88,000	,,	,,	6⅜	Epsom 5 p.c.	115–120	..	5 10 5
88,416	,,	June 27	3	3 p.c. Deb. Stk.	68–70	..	4 5 9

Prices marked * are "Ex-Div." † Next dividend will be at this rate.

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